JULY 1935

MODERN MECHANIX & INVENTIONS MAGAZINE

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MODERN MECHANIX
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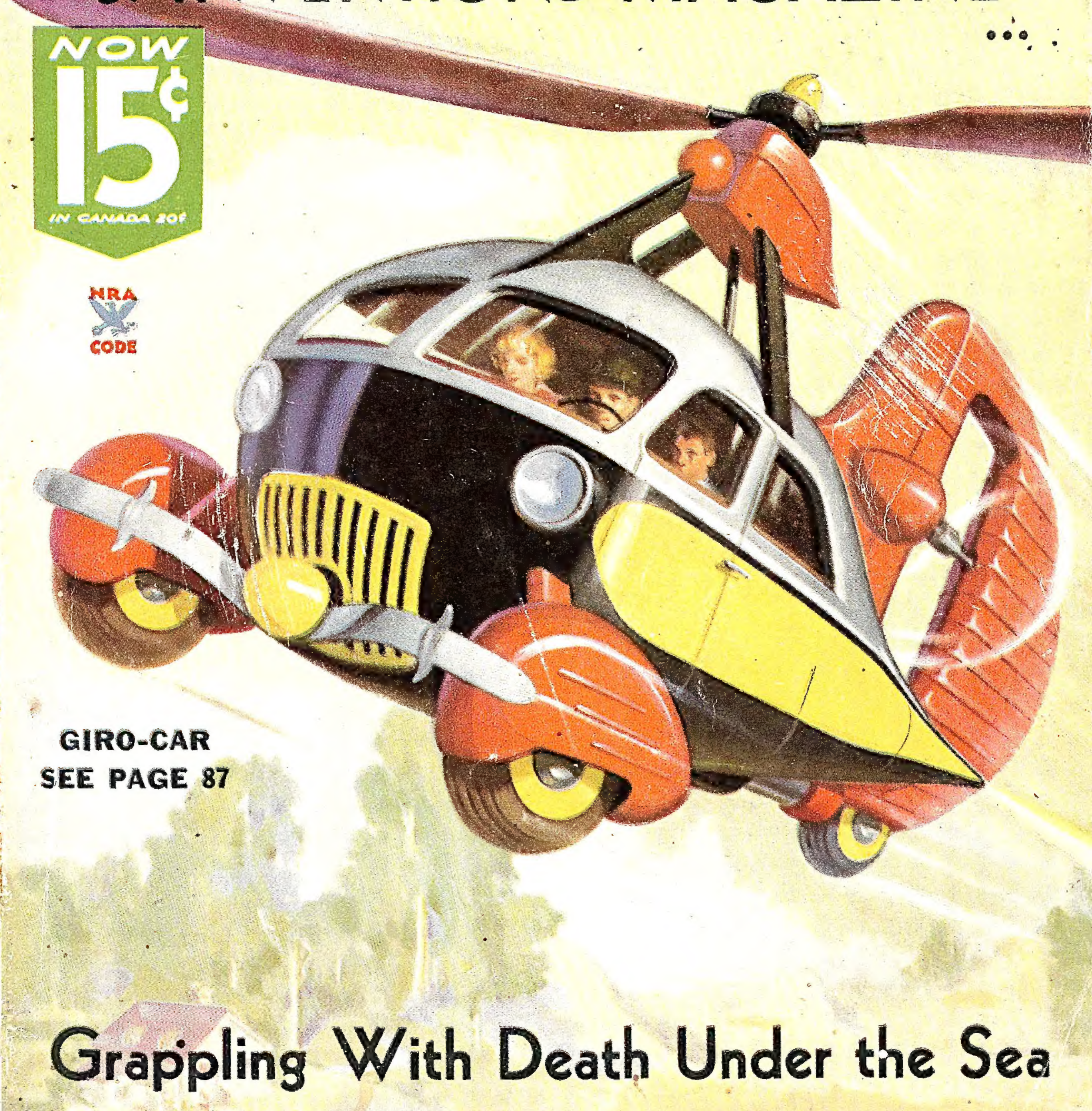

GIRO-CAR
SEE PAGE 87

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Debunking Poison Gas War Scares

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New Low Prices!

ATLAS SAVED US 50% ON OUR TIRES
AND THEY ARE GUARANTEED FOR A WHOLE YEAR!
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This old reliable company is first choice with thousands of motorists who demand highest quality at lowest cost. Actual tests on roughest roads prove that standard brand tires reconstructed by the scientific Atlas process deliver **50 to 60% more service. Order today, save money. Orders filled promptly.**

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Size Rim	Tires	Tubes
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28x5.50-18	**3.35**	1.15
29x5.50-19	**3.35**	1.15
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...6.00-17	**3.40**	1.15
30x6.00-18	**3.40**	1.15
31x6.00-19	**3.40**	1.15
32x6.00-20	**3.45**	1.25
33x6.00-21	**3.65**	1.25
32x6.50-20	**3.75**	1.35

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30x3......	**$2.25**	$0.65
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32x4......	**2.95**	0.85
33x4......	**2.95**	0.85
32x4½....	**3.35**	1.15
33x4½....	**3.45**	1.15
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33x5......	**3.75**	1.45

Finest Quality Tubes! Well-Known Brands at Lowest Prices in History!

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30x5......	**$4.25**	$1.95
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Rockford, Ill.

Send $1.00 Deposit with each tire ordered ($4.00 deposit on each truck tire). Balance C. O. D. If you send cash in full deduct 5%. Year's service guaranteed, or replacement at ½ price. **Order today.**

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National Radio Institute

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Act today for better pay. Act today to break away from a low pay, no-future job. Act to get away from having to skimp, scrape to pay your bills. Mail coupon for my free 64-page book. It tells you how I will train you at home in your spare time to be a Radio Expert; about my training that has doubled and tripled the pay of many.

Many Radio Experts make $40, $60, $75 a Week

Consider these facts—think of the good jobs they stand for. Over 16,000,000 Radio sets in use, over 600 broadcasting stations, over 40 large manufacturers of Radio sets, over 3,000 manufacturers of parts, over 100 Police Departments Radio equipped, airplanes and airports Radio equipped. Thousands of ships touching every seaport of the world, Radio equipped. Over 35,000 stores selling sets and parts, about 2,000,000 autos Radio equipped and about 20,000,000 unequipped. Loud speaker systems wherever people gather, indoors and outdoors. Commercial Radio stations dotting our coast lines. Radio a big industry—is growing bigger fast. A few hundred $40, $60, $75 a week jobs, have grown to thousands.

Get ready now for Jobs like these

A spare time or full time service shop; installing, maintaining, operating—broadcast, aviation, commercial, ship, television and police stations. A Radio retail business of your own. Installing, maintaining, servicing loud speaker systems. A service or sales job with a store or jobber. I'll train you for good jobs in every branch of Radio.

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I'll make this agreement with you. If you are not entirely satisfied with my Lesson and Instruction Service when you finish, I'll refund your tuition.

Find out what Radio Offers

Mail the coupon. My book of information on Radio's spare time and full time opportunities is free to any ambitious fellow over 15. Read what Radio offers you. Read about the training I offer you. Read letters from graduates—what they are doing and making. There's no obligation. Mail coupon in an envelope or paste it on a postal card—NOW.

J. E. SMITH, President, National Radio Institute
Dept. 5GH, Washington, D. C.

FREE SAMPLE LESSON

Take advantage of this offer. Mail the coupon RIGHT NOW, and I'll send you FREE a Sample Lesson that only my students have received in the past. This fascinating book, "A Bird's-Eye View of Radio" is just packed and jammed with information about this growing industry. The reason I am willing to send it to you is to PROVE that my Course is simple, easy to understand, and enjoyable to study. I want to SHOW YOU that I can train you, just as I have ALREADY trained thousands of men. Many of them with not even a grammar school education, and no Radio or technical experience, have become Radio experts, and now earn two or three times their former pay. Mail the coupon NOW.

PROOF THAT MY TRAINING PAYS

Has Made Around $25,000

"I am operator at the coast Radio station here, call WMW, and have been here for the past two years. I like the work very much as there seems to be something fascinating about it. Since taking up Radio back in 1924, I have made around $25,000 in this game."
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"I have been working nights and Sundays for the past several weeks. I have another graduate working with me evenings now. I am in business for myself and supporting a family through profits made solely from Radio work, and not afraid of losing my job."
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$412 In Nine Months' Spare Time

"I get all my work through satisfied customers and their friends. My estimate is approximately $412 profit for about nine months spare time work. I am proud of N.R.I., and want to help prove to other people what N.R.I. can do for any man willing to study."
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Now Service Manager and Studio Engineer

"I found your Course very thorough. I am grateful to your employment service which has assisted me in the past. I am Radio Service Manager for the Robert Simpson Eastern Ltd., in the day time and studio engineer for the Canadian Radio Commission in the evening."
L. A. Canning, 46 Westmount St., Halifax, N. S., Canada

MAIL THIS NOW !

J. E. SMITH, President
National Radio Institute, Department 5GH
Washington, D. C.

Dear Mr. Smith: Without obligation send me the Sample Lesson and your free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time.
(Please Print Plainly)

Name ....Age ....

Address ....

City ....State ....

IFR

Are you, too, up against life's big question—

"How Can I Make More Money?"

Every bill to be paid, every need to be met, every dream still unfulfilled—demands the answer to this question. For on its answer hang all the other answers of life: how you live, what you wear, where you go, what you do, the position you hold, the one you hope to hold in future!...

MORE than anywhere else, this question haunts you daily on the job. You want a bigger salary; more pleasant and interesting work to do; more advantages for your loved ones—recreation, travel, social activities. And so, as you keep plodding on, in between the little thoughts comes this big one, again and again: "How can I make more money?"

Well, how can you? . . . By working harder than ever, so as to attract more attention to your industry? Thousands of people are working harder than ever, these days; employers have no worries on that score. By trying to "get a stand-in" with somebody of influence? Plenty of people have tried that, too—only to fall down because they couldn't deliver. By getting "outside work" to do? Sooner or later, your regular job suffers —and then what?

Out of the corner of your eye you can see a long line of folks just waiting for the job you have now. Any time you're "out," a dozen others are ready to step in. So it's dangerous to resign and look elsewhere, isn't it? Besides, jobs in your same line elsewhere are bound to pay about what you're earning now.

What's Wrong, Anyhow?

Let's be quite serious for a moment about this "money" question. Who, as you glance around the business world, are the money-makers in it? Are they the filing clerks, typists, stenographers, bookkeepers, timekeepers and routine clerical people? Or are they the expert salesmen, the accountants and C. P. A.'s, the attorneys, the traffic managers, the personnel directors, the sales correspondents, the sales managers, and other executives who give orders for other people to execute?

And how did these money-makers, with their enviable jobs and opportunities, "get that way"? Was it simply by working hard—having a "pull"—changing jobs till they found the fat salaries they wanted?

Experience says no! . . . They make more money than the rank-and-file in business for just one reason: they have *trained* for the better-paid specialized functions that Tom, Dick and Harry, the rank-and-file, cannot discharge.

Their Answer is Yours

That is their answer to life's biggest question. It is *your* answer as well. And LaSalle Extension University has made it possible for YOU—granted a real purpose and adequate education—to train for the field in which you would prefer to earn more money. Without leaving your job, you can do what more than 800,000 men and women have done already: utilize your spare time for home study that definitely equips you to get your money question *answered.*

The coupon below lists a number of specialized vocations which today offer the interesting work, attractive opportunities, gratifying incomes—all the rewards that go with "bigger responsibilities." Pick out the one that most appeals to you, check it, and add your name and address. Find out the interesting facts about it which your inquiry will bring you promptly, without obligation. Send your request along NOW, and learn how to get the one right answer to this biggest of life's questions—the question of "more money."

Don't act on this advertisement unless you're really in earnest.

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I would like to have your special booklet—without any cost or obligation to me—about my opportunities and your success training in the business field I have checked.

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- ☐ **Higher Accountancy**
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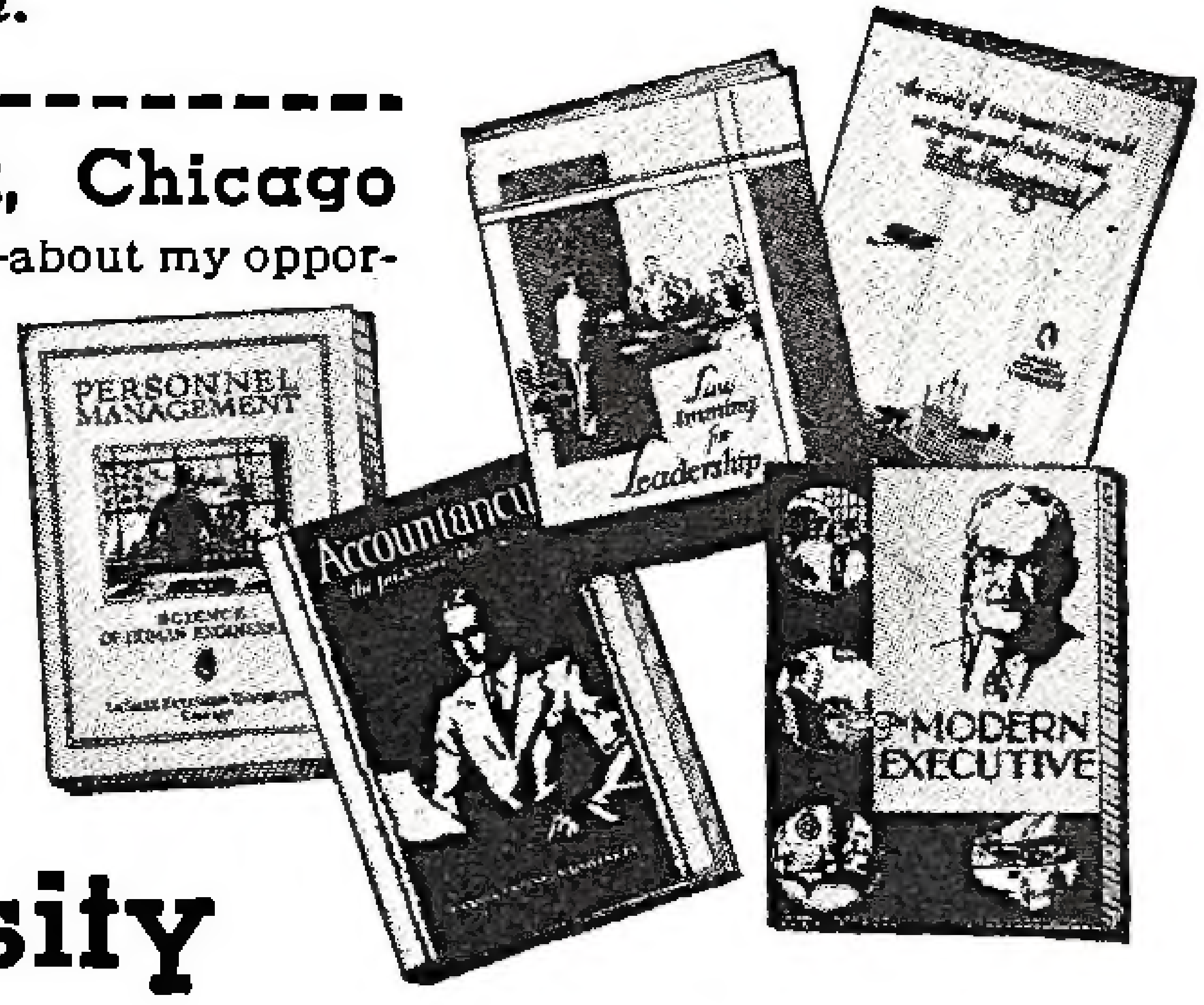
Name.. Age..................

Address..



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JULY
1935

MODERN MECHANIX
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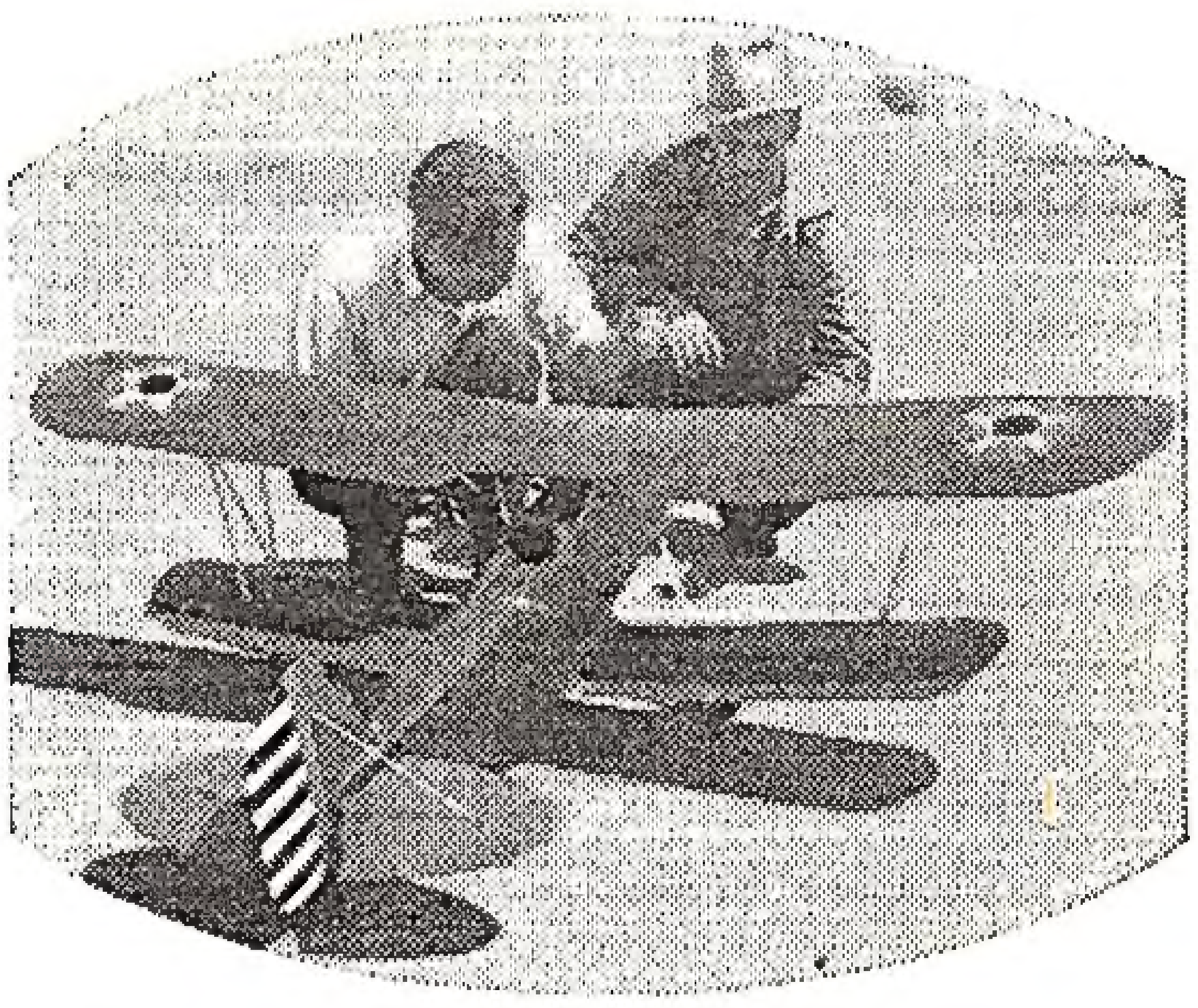
Let's Build a Gas-Powered Model Airplane



Beginning in the August issue of Modern Mechanix & Inventions Magazine complete plans will be published for the construction of one of the neatest gas-powered pursuit plane models ever published. The completed model, scaled to size, is shown above. Want to build one? Put your order in now for the August issue.

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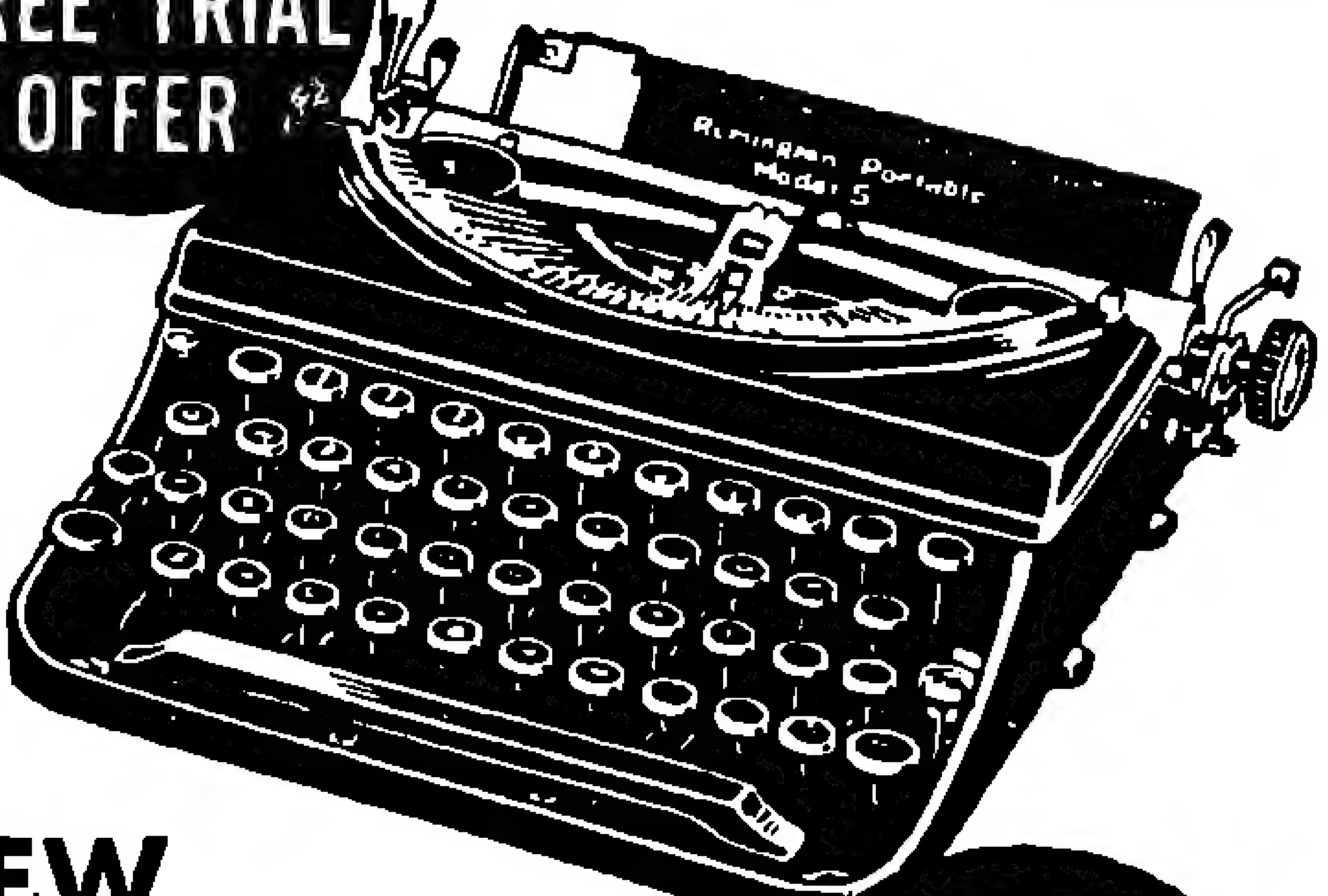

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FIRST TIME! Remington's new purchase plan now lets you buy a genuine latest model Remington Portable No. 5 direct from the factory for only 10c a day. Not used or rebuilt. Not incomplete. A beautiful brand new regulation Remington Portable. Standard 4-row keyboard, standard width carriage, margin release on keyboard, back spacer, automatic ribbon reverse; every essential feature found in standard typewriters. With your machine we send you *free* a 19-page course in typewriting. Teaches touch system quickly, easily. Soon you dash off letters quicker than with pen and ink. You also get a handsome, sturdy carrying case free.

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10-DAY FREE TRIAL OFFER

The amazing low price and easy terms now make it possible for you to buy this genuine complete Remington Portable for only 10c a day. But we cannot guarantee present prices long. Higher wage scales, rising cost of materials, everything points to higher prices. So we say, "Act now . . . while our liberal offer still holds good!"

You Don't Risk One Cent

Try this typewriter in your home or office on our 10-day FREE TRIAL OFFER. Then, if you do not agree that it is the finest portable *at any price,* return it at our expense. *You don't even risk shipping charges.* Don't wait. Mail coupon now. It's the best chance you've ever had to own so complete a machine for so little money. So act NOW!

CLIP COUPON NOW

Remington Rand Inc., Dept. 141-7
205 E. 42nd St., N. Y. C.

Please tell me how I can buy a new Remington Portable typewriter for only 10c a day. Also enclose your new catalog.

Name ____________________

Address ____________________

City __________ *State* __________

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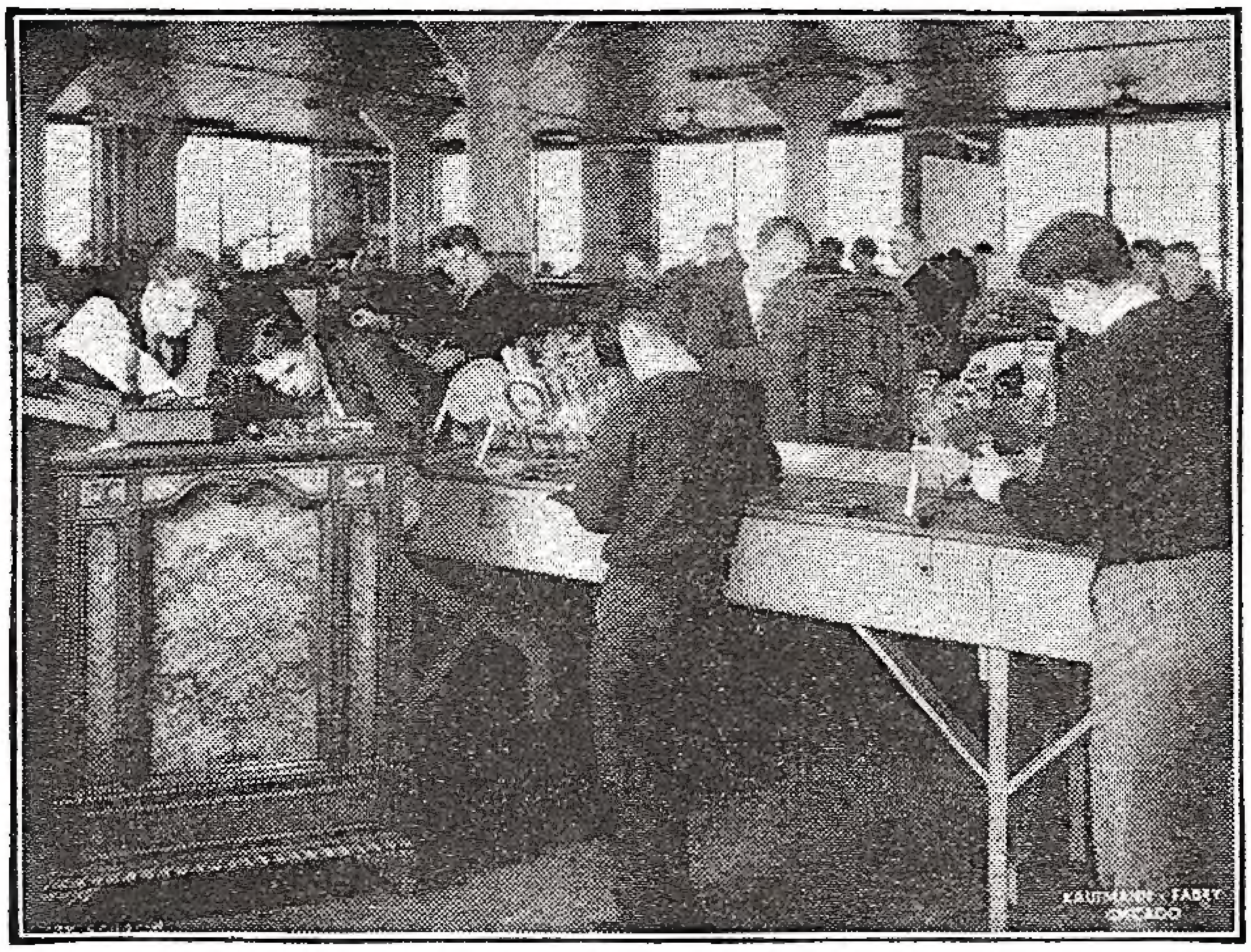

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Yes, sir! I mean what I say. I'll train you in 10 weeks right here in the Great Coyne Shops — NOT BY CORRESPONDENCE — but by actual work on **Radio, Sound** and **Television** equipment AND YOU WON'T HAVE TO START PAYING ME BACK UNTIL FIVE MONTHS FROM THE DATE YOU START SCHOOL, AND THEN YOU'LL HAVE OVER A YEAR TO COMPLETE YOUR PAYMENTS.

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By Actual Work

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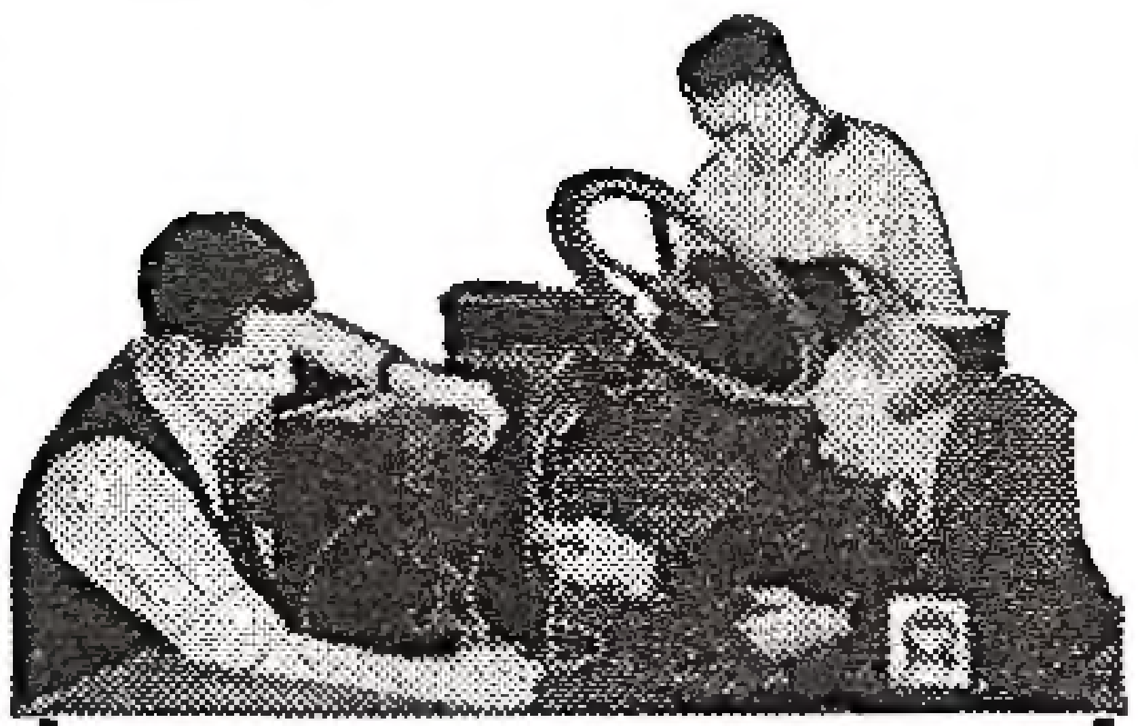

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RADIO SERVICING
PUBLIC ADDRESS SYSTEMS
BROADCAST STATION OPERATOR
TALKING PICTURE STUDIOS
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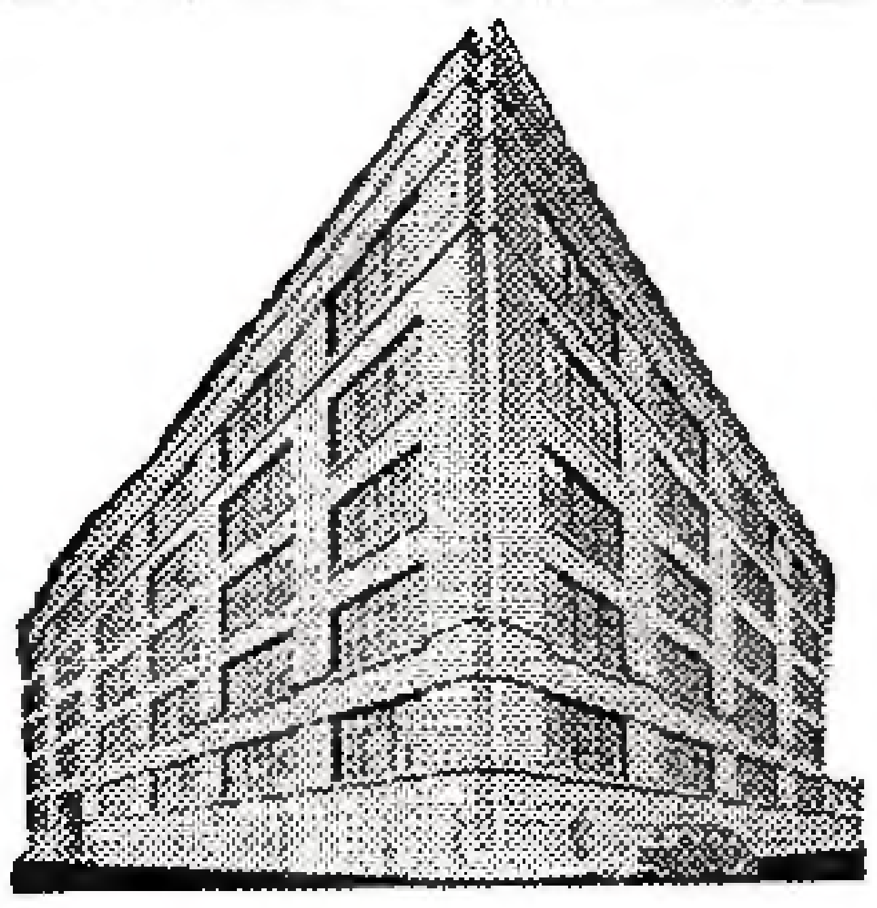

Home of Coyne Shops

This is our fireproof modern Building wherein is installed thousands of dollars' worth of Radio equipment of all kinds. Every comfort and convenience has been arranged to make you happy and contented during your Training.

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"Two weeks after graduation I received a splendid job. The main consideration given my application was that I was a Coyne Trained man," reports Harold Soucy of Illinois. "I wish to thank your Employment Manager for securing this position for me," writes Albert Yagon, "he sent me out to this Company the first day and I was employed there immediately." And I could go on quoting from hundreds of letters of successful Coyne Trained men. What they have done, you should be able to do!

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Right now I'm including my big new Electric Refrigeration and Air Conditioning course at no extra cost.

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Coyne is your one greatest chance to get into Radio. Every obstacle is removed. This school is 36 years old—Coyne training is tested—proven beyond all doubt—endorsed by many large concerns. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne Book with photographs . . . facts . . . jobs . . salaries . . opportunities. Tells you how many earn expenses while training and how we assist our graduates in the field. This does not obligate you. So act at once. Just mail coupon.

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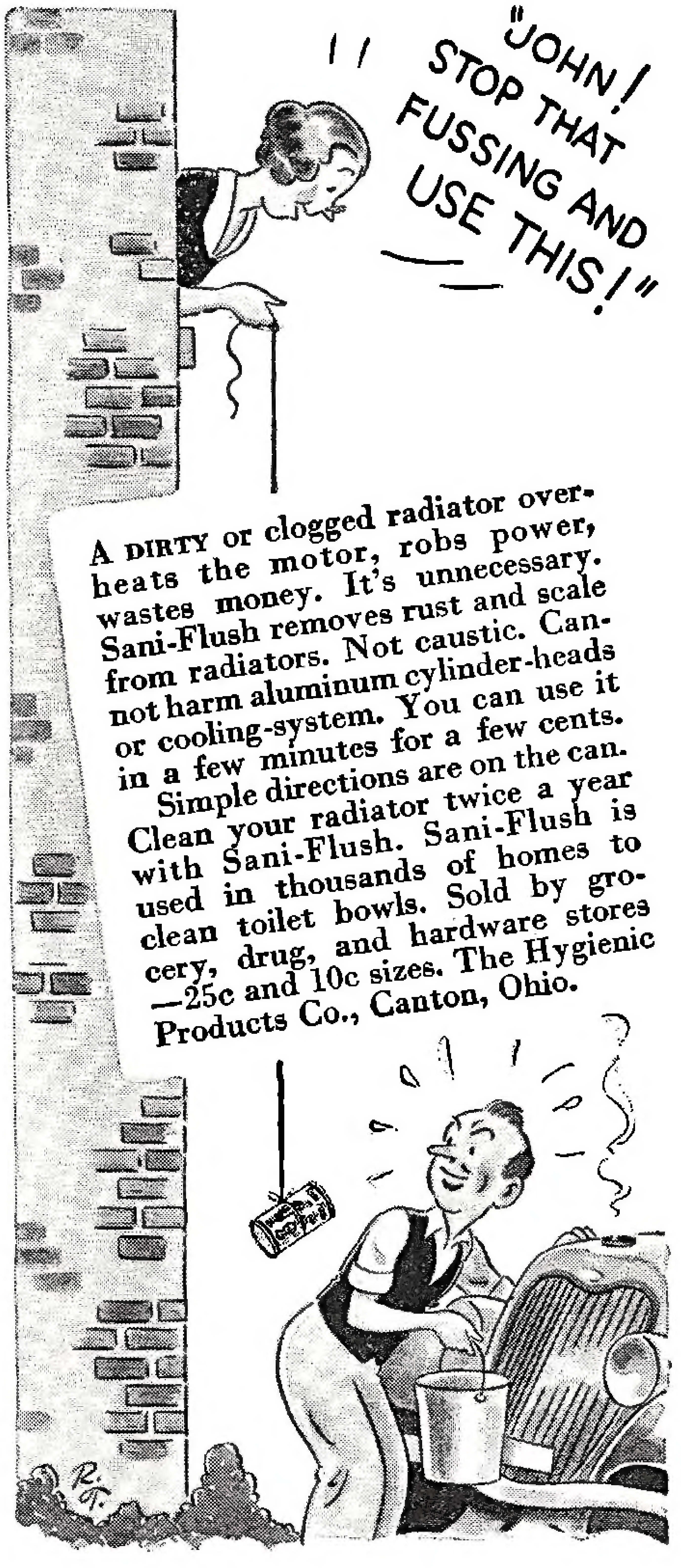
"JOHN! STOP THAT FUSSING AND USE THIS!"
R.G.

A DIRTY or clogged radiator overheats the motor, robs power, wastes money. It's unnecessary. Sani-Flush removes rust and scale from radiators. Not caustic. Cannot harm aluminum cylinder-heads or cooling-system. You can use it in a few minutes for a few cents. Simple directions are on the can.

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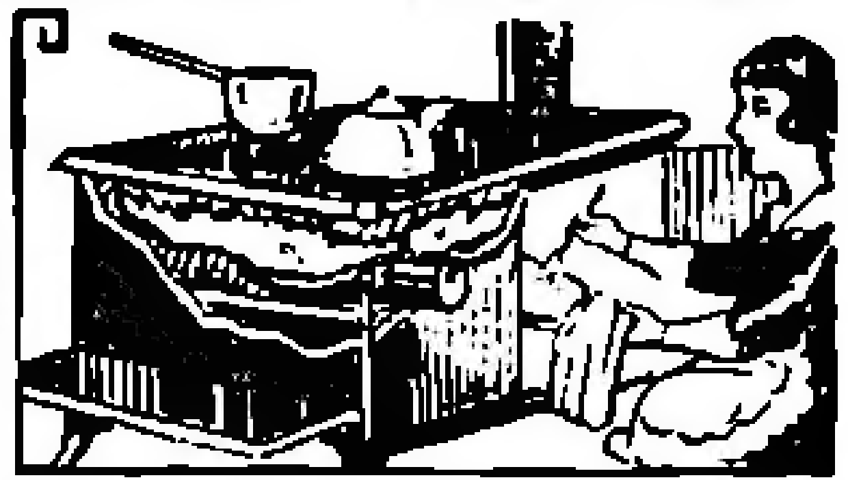

COOLER KITCHEN IN SUMMER

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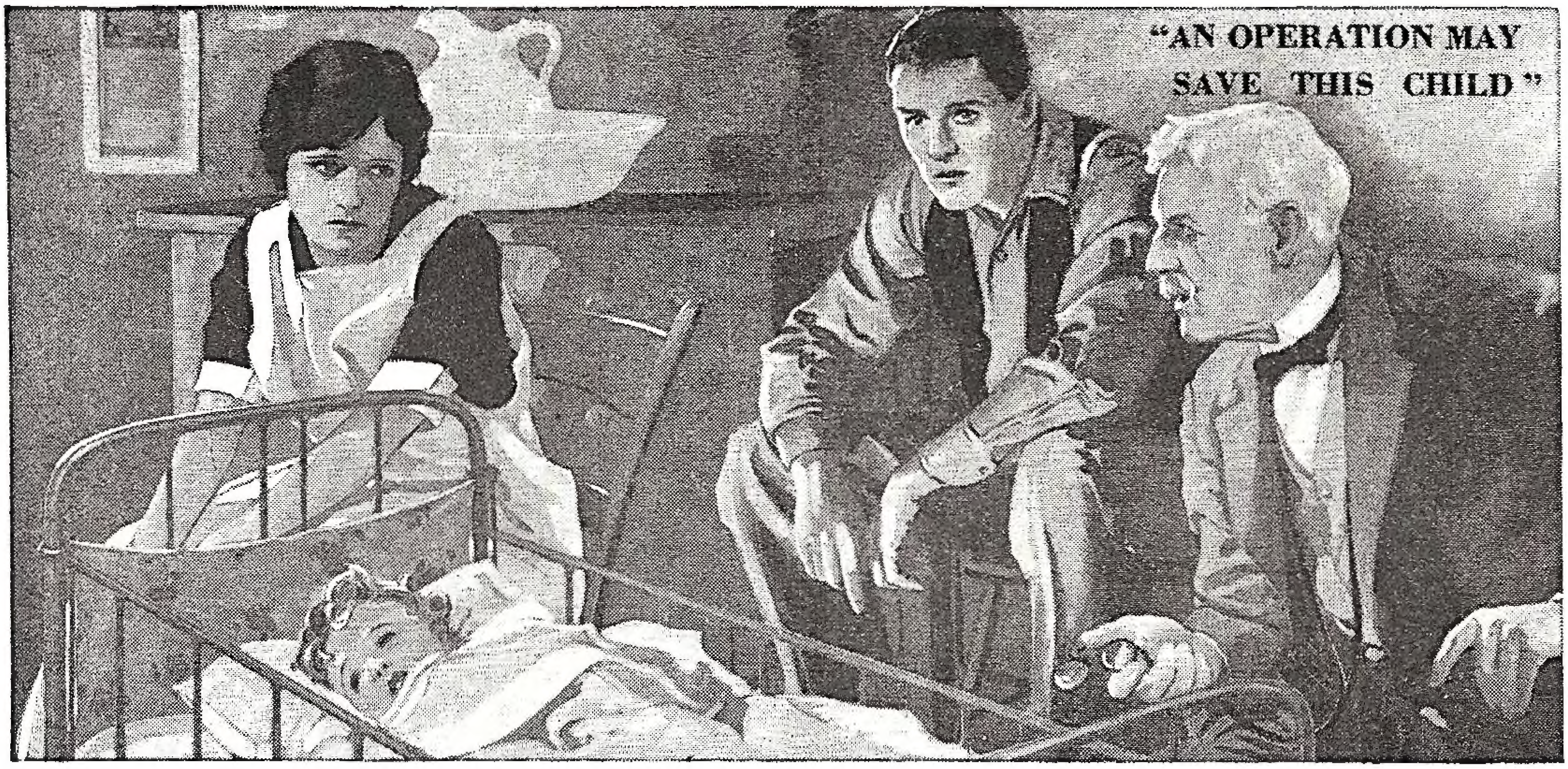
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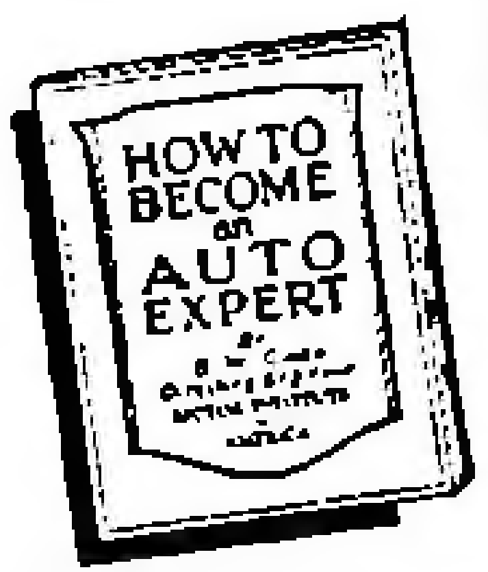
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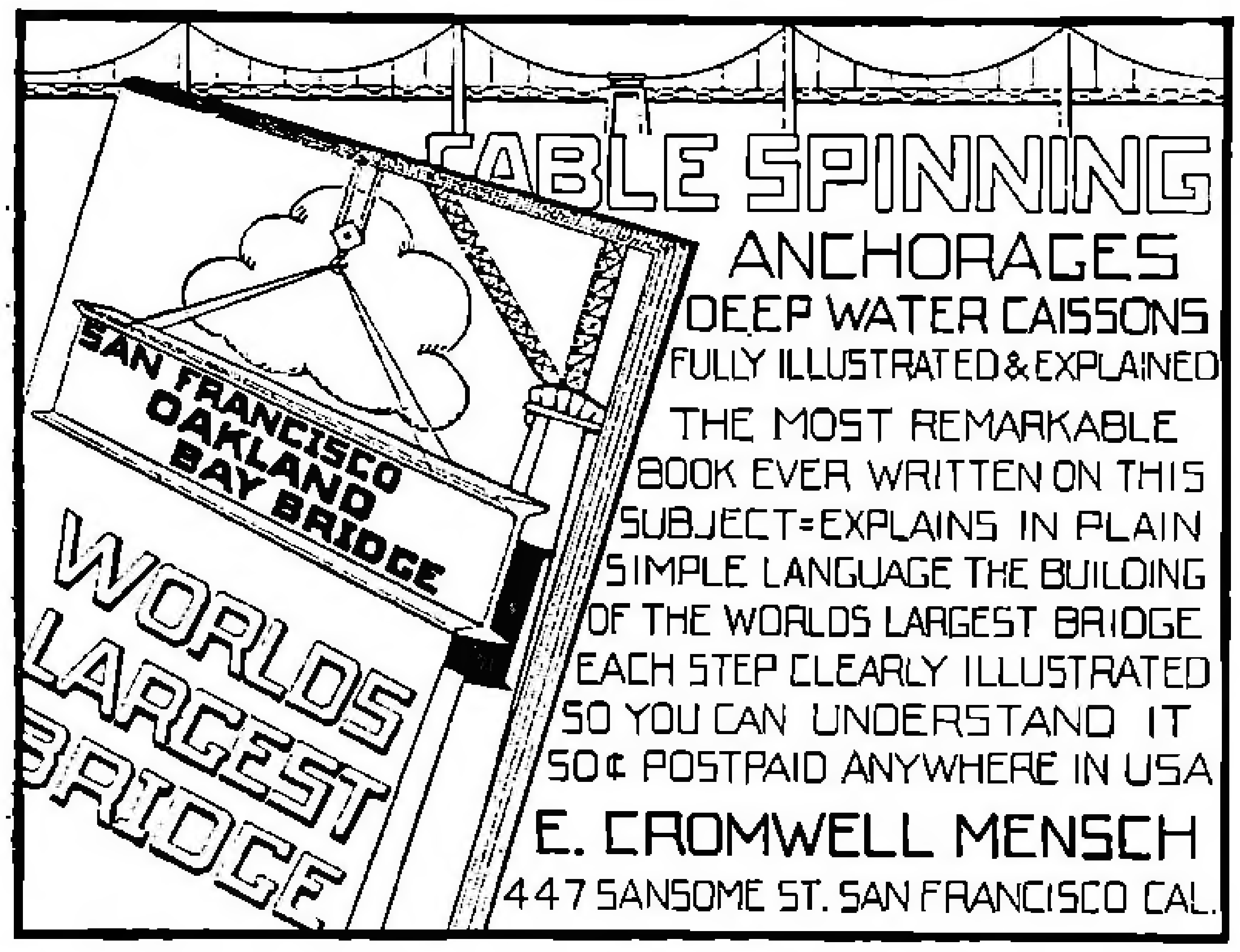
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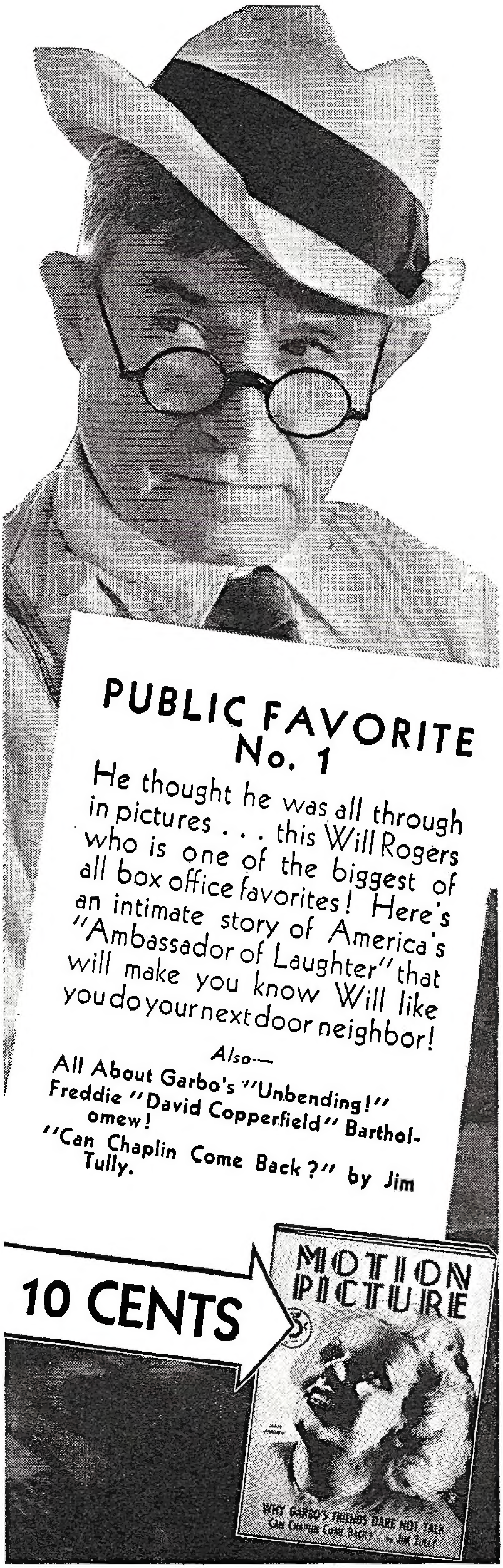
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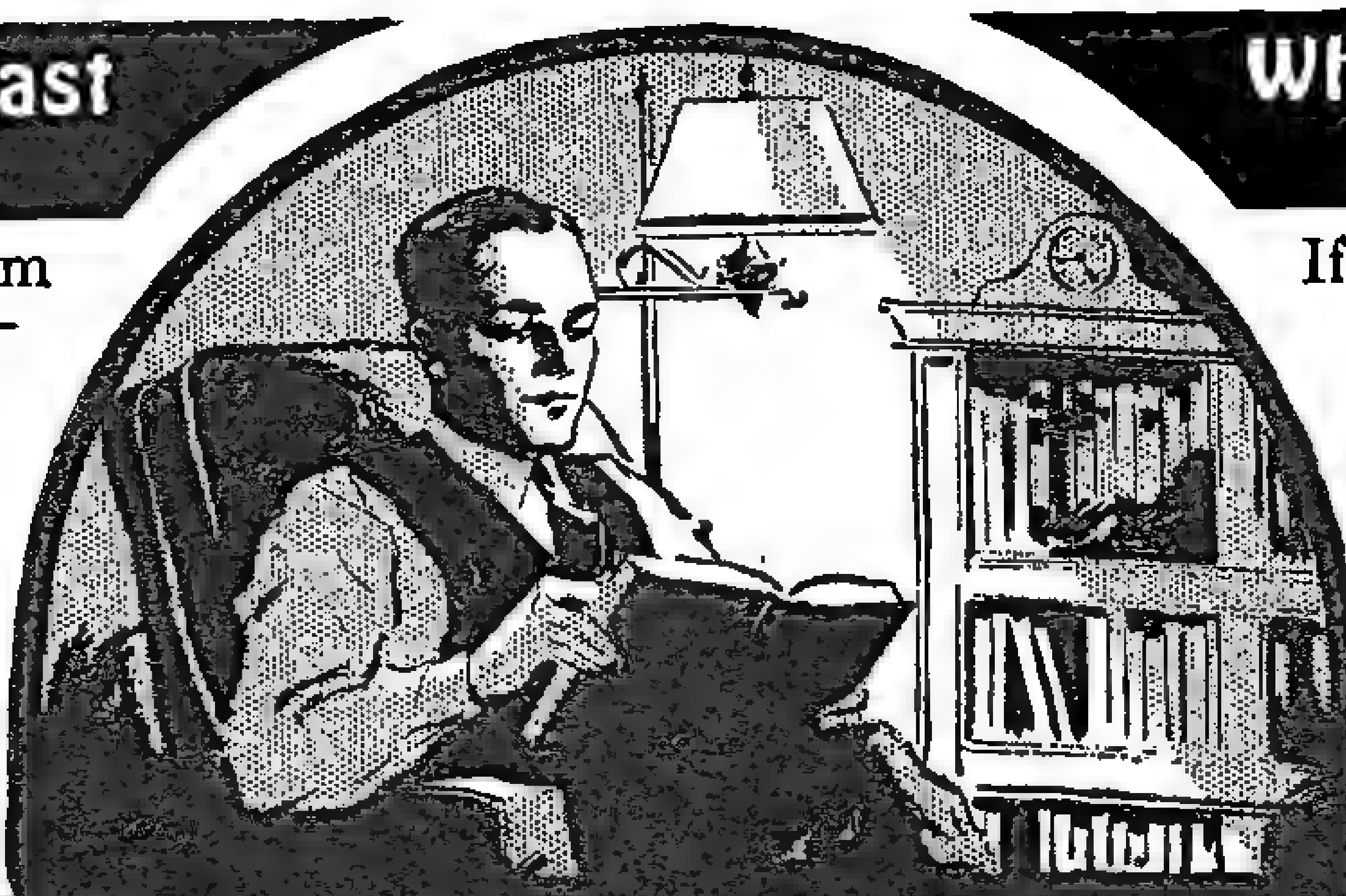

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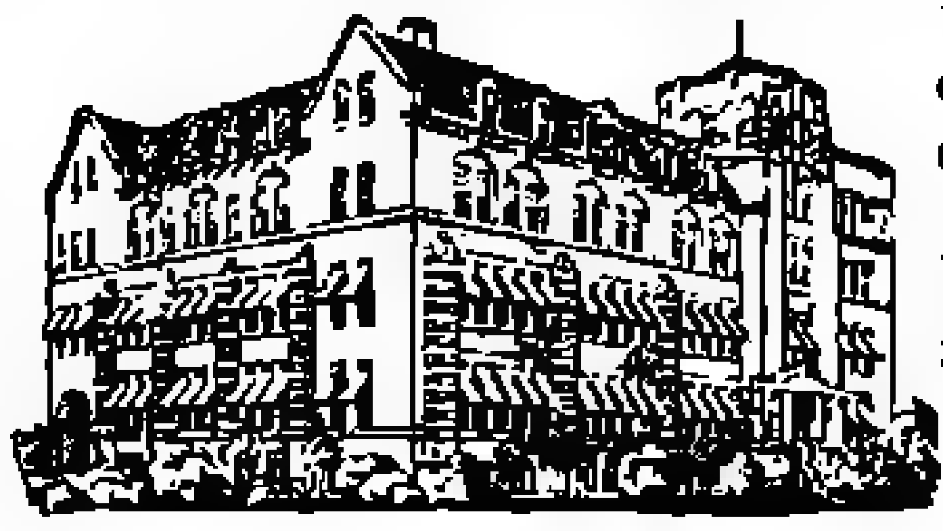

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A frank man to PATENTS-INVENTIONS

THE world of invention moves on. The Patent Office clerk who resigned his job back in 1833, because he said there was nothing left to invent, now stands out as one of the funniest men in American History. Think of everything that's happened in the last 100 years! Why, only recently the papers carried a notice that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new, non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

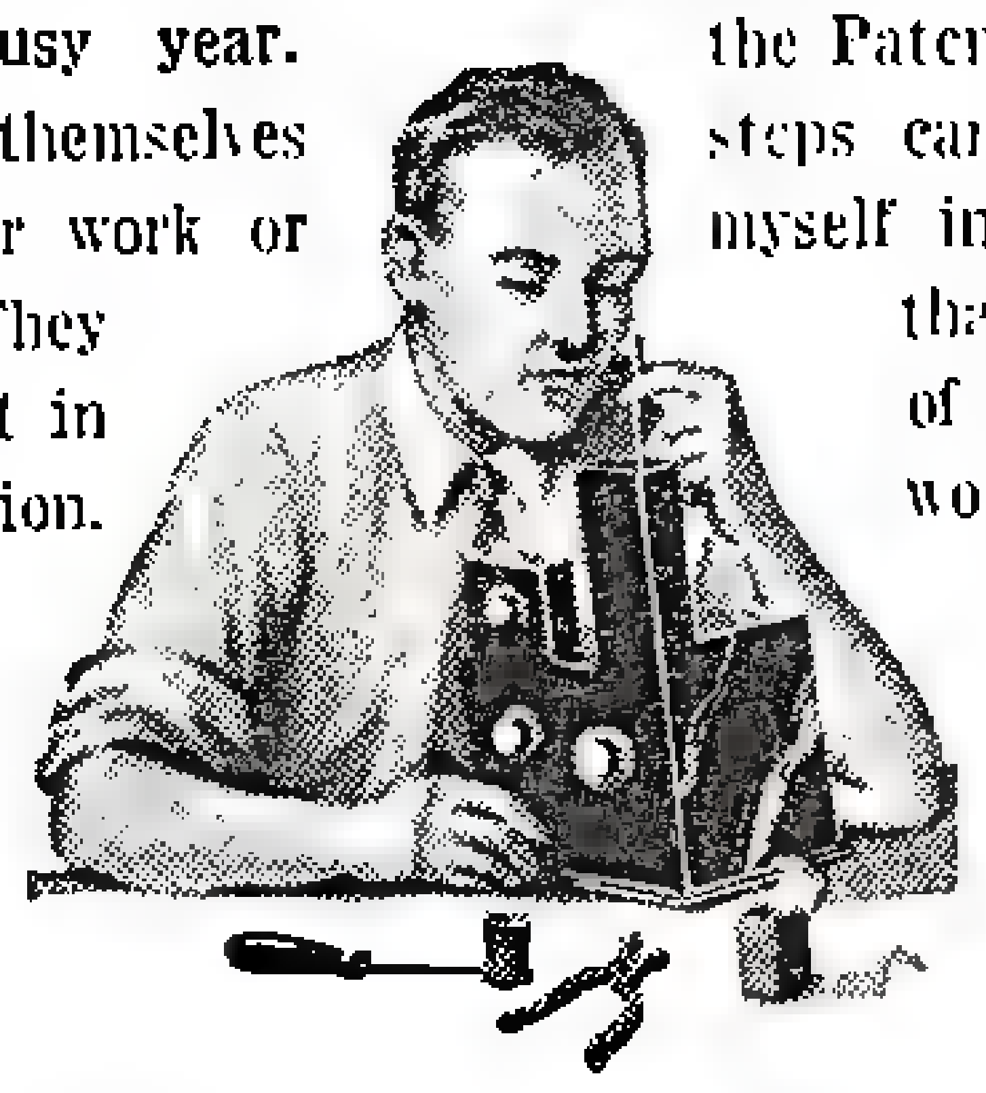
Remember this: For every outstanding big invention there are thousands of small, simple things for use in the home, the office, the factory, on the farm, on every sort of travel conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop.

Many Little Ideas Have Big Commercial Possibilities

A person finds something he's using doesn't work right, or it's clumsy, or costs too much. He gets a happy thought. He improves the old Article. That's contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things millions of us use didn't come from the brains of engineers and physicists. They came from the mind and maybe the crude home work bench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance or circumstance has given him to do. The "little" man's opportunity as an inventor was never greater than it is today.

Who Are Inventors?

You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves inventors at all. During their work or leisure they get an idea. They work it out on paper. They get in touch with us about Protection. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old-fashioned straight hair pin to make it stay in place? **Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.**



Can You Answer These Questions?

Ask yourself these questions: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the *first* man to think of *my invention*? Is a Patent worth the cost? Do I need a model? Should I try to sell my invention before I have it Patented? Is there any safe, business-like way to secure financial help? If I do apply for a Patent, how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been patented? These are but a few of the questions which usually confront the average man. You need the answers! **YOU CAN HAVE THEM, without cost, trouble, or delay.**

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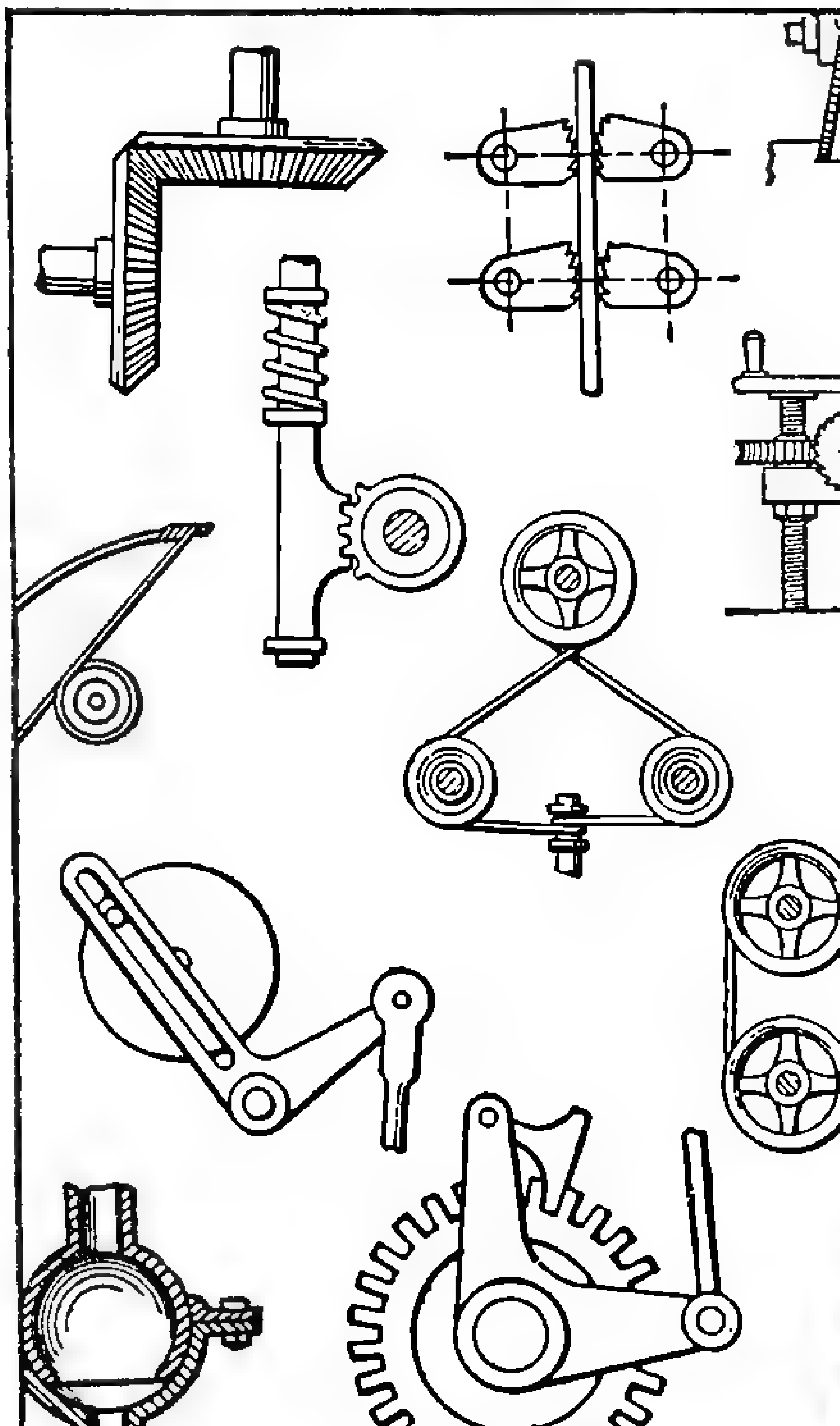

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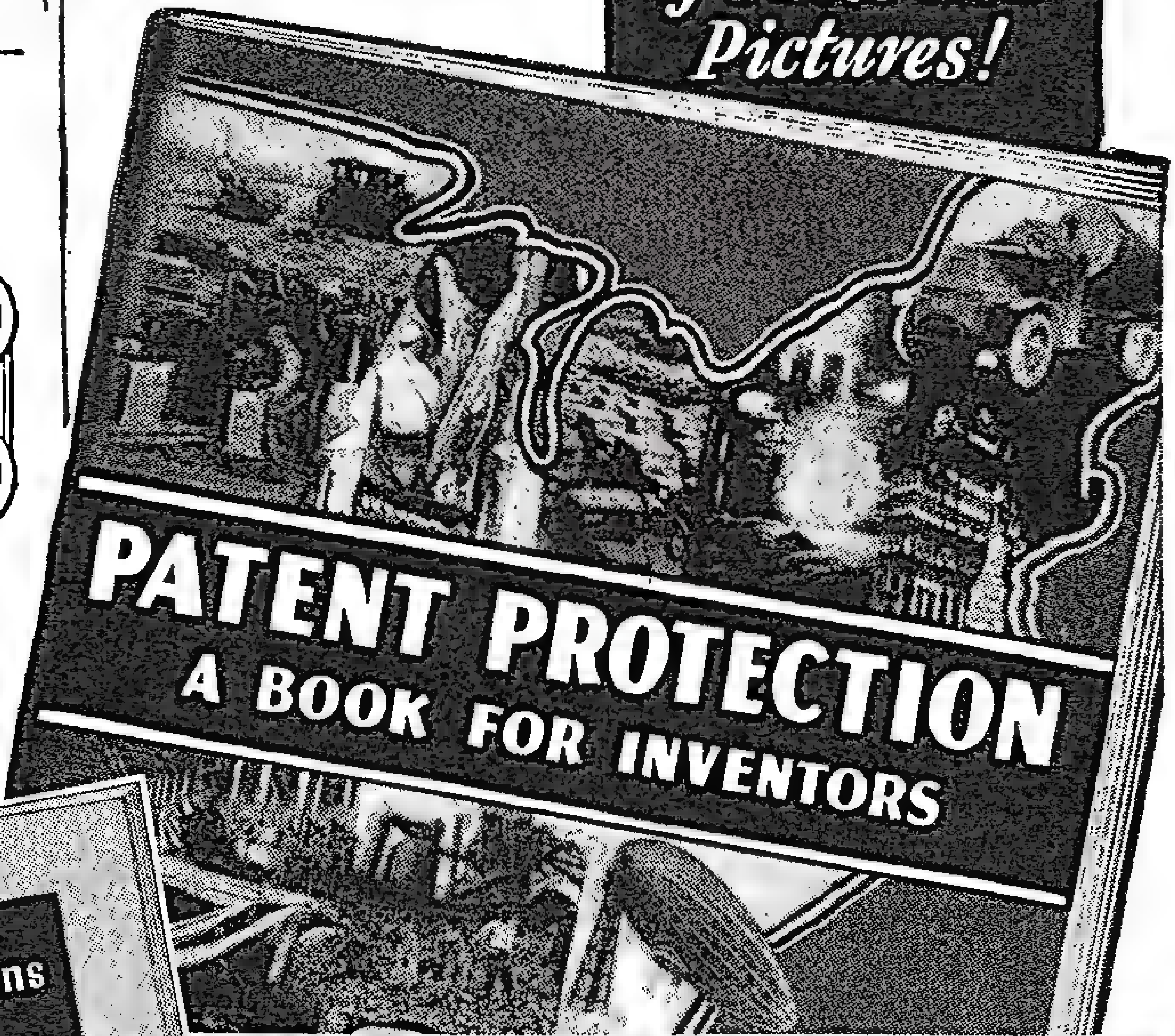
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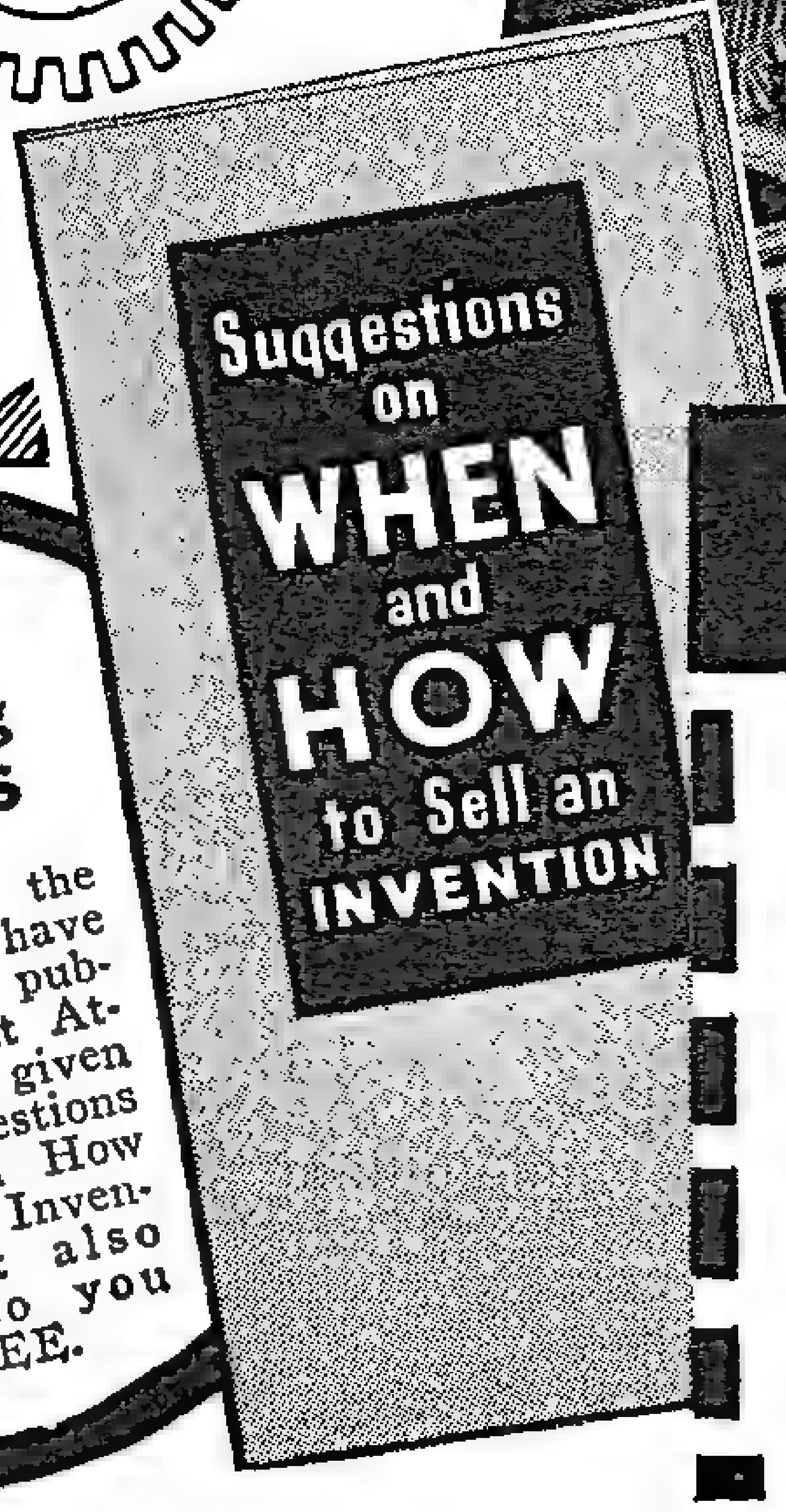
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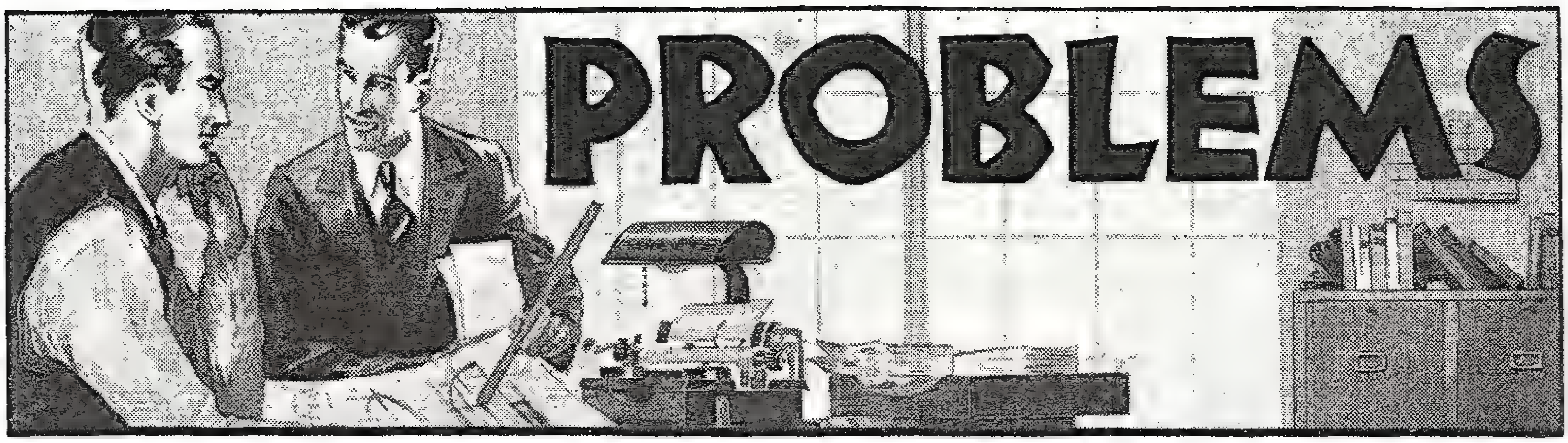

Write the Problems Editor for where-to-buy and how-to-fix advice.

PLASTER OF PARIS

Please tell me how to keep plaster of Paris from drying so fast while working with it.—J. C. DuBois, Pa.

You can retard the setting of plaster of Paris by thoroughly mixing with each 100 parts of the dry powder about 4 parts of either powdered marshmallow root, dextrin, gum arabic, or glue. Thorough mixing is necessary, after which the mixture should be passed at least three times through a fine sieve. About one ounce of citric acid for each 100 pounds of plaster will also delay the setting for several hours.

SNAKE VENOM CURE

Where can I purchase snake venom, for use in curing persistent and severe nose hemorrhages?—G. J. C., Alhambra, Cal.

The venom of poisonous snakes is deadly, and should never be used except when prescribed by a competent physician. Cobra venom is being supplied to physicians and medical laboratories by Dr. Raymond L. Ditmars, Curator of Mammals and Reptiles, New York Zoological Park, New York City.

TIMING CHAIN PROBLEM

Is it possible to take a link or two out of a timing chain of an engine to take up the slack, without changing the timing of the engine?—A. G., Bristol, Conn.

In the ordinary automobile the slack will always be at the bottom half of the timing chain. Since the top, or driving half of the chain is always taut, links can be taken from the lower half without changing the timing.

FREAK RADIO RECEPTION

For about 15 minutes each day, as the sun is setting, there is a terrible howling in my radio set, heard on every point on the tuning dial. In order to pick up any stations at all during the night, I have to disconnect the ground wire, and run the aerial to the ground terminal of the set. I am using a long pipe running out into a lake as a ground. Can you tell me what is wrong?—M. H. M., Marcell, Minn.

If another radio set operating from a different aerial and ground at your location gives the same noises at sunset, the trouble is caused by electrical disturbances in the atmosphere accompanying the setting of the sun. Your ground pipe, however, is far too long for good radio reception. Use as short a ground lead as possible, running to a long metal stake driven into the moist ground.

"GALLOPING" BOAT

My version of "Miss Modern Mechanix," an outboard-powered speed boat, begins to "gallop" or rock about an axis through the hull at the step at about two-thirds of her maximum speed, becoming almost uncontrollable and very uncomfortable as the throttle is opened farther. I have experimented with different propeller shaft angles, propeller depths, and load distributions, but nothing seems to help.—C. M. C., Houlton, Maine.

The theory of porpoising or "galloping" is not very well understood even by naval architects. Often two identical hulls will show porpoising in one and not the other. The government is at present investigating the causes of this action in connection with seaplane hulls at the testing basin at Langley Field.

One cure for porpoising is to move all weights in the boat as far back as possible; another is to build a false step about 6″ forward of the main step, building it up with wood wedges spaced about three inches apart, and experimenting with the angle of the step.

METAL PLANKING FOR BOATS

Can all-metal boats, or wood-frame boats with metal planking, be built in the home workshop?—S. R. J., Austin, Minn.

Metal planking is entirely practical for small boats of the straight line frame type. In the MM family the cruisers Gannet, Dorothy, and Buddy could be metal planked. Frames can be made of 1″x1″x⅛″ angle irons, and the

[*Continued on page* 16]

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Problems Editor Answers Queries

[*Continued from page* 14]

planking of No. 16 to No. 18 galvanized sheet iron. Naval architects do not recommend metal for continuous use on salt water.

ELECTRIC EYES FOR AUTOS

I would like to install photo-electric equipment on my car to do stunts which will attract attention. Have you any circuits for this?—S. E. T., Toronto, Ont.

The electric eye may be used to operate your courtesy light switch automatically when a car approaches. Mount the photocell just inside the windshield, facing outward and to the left, where it will be in the headlight beam of a car approaching at night, and connect the photo-electric relay to your courtesy light switch. Another stunt involves connecting the relay contacts to your parking light switch, placing the photo-cell inside the car, and parking near some flashing sign. With this connected properly, your car lights will be on only when the flashing sign is off.

MAGNETIC SPEAKER CONNECTIONS

How can I connect a magnetic speaker to my radio without reducing too much the volume of the magnetic speaker?—M. R., Detroit, Michigan.

A magnetic speaker has too high a resistance to work satisfactorily when connected in series with the voice coil of a dynamic speaker. If connected directly across the primary winding of the output transformer there will be distortion, but satisfactory operation can be obtained with most sets by placing a 1 or 2 mfd.—600-volt condenser in series with the magnetic speaker, then connecting it across the transformer primary.

PROPELLER IN WIND

Does a propeller which is turning freely in a wind push air ahead of it?—S. R., Miami, Florida.

A propeller pushed by the wind will always lag a little behind, because of friction losses; this is known technically as "slip." There is, then, a partial vacuum ahead of the propeller blades, and air is pulled back rather than pushed ahead.

TRANSFORMER HEATS

Can a transformer be placed in any liquid or oil which will keep it cool?—F. M. S., Minneapolis, Minn.

Transformers used for welding or other heavy work can be immersed in any good grade of thin lubricating oil. Nearly all power transformers are so mounted, a fireproof oil with high insulating qualities being used by the power companies for this purpose. Excessive heat might set ordinary oil on fire,

[*Continued on page* 24]

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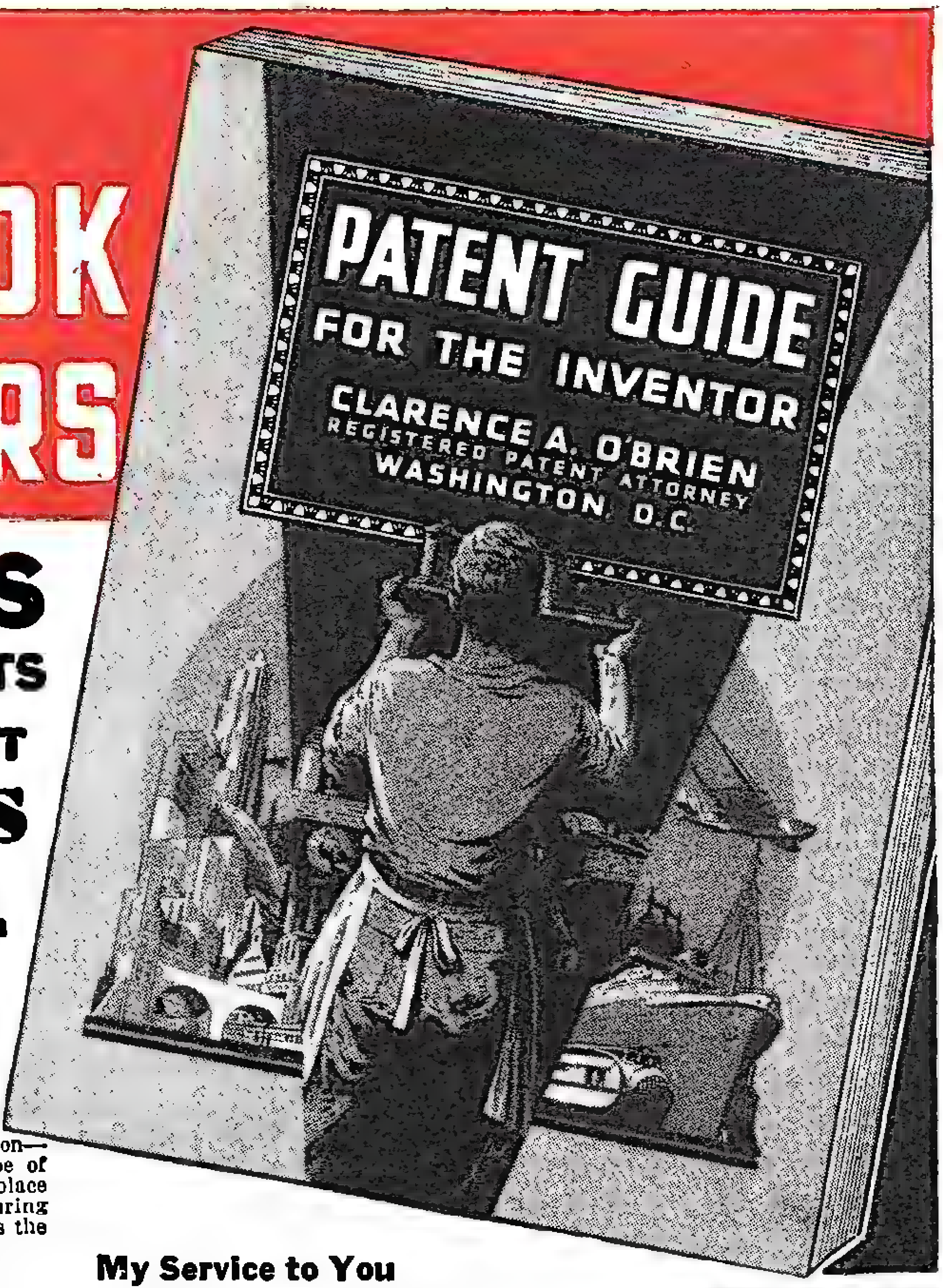

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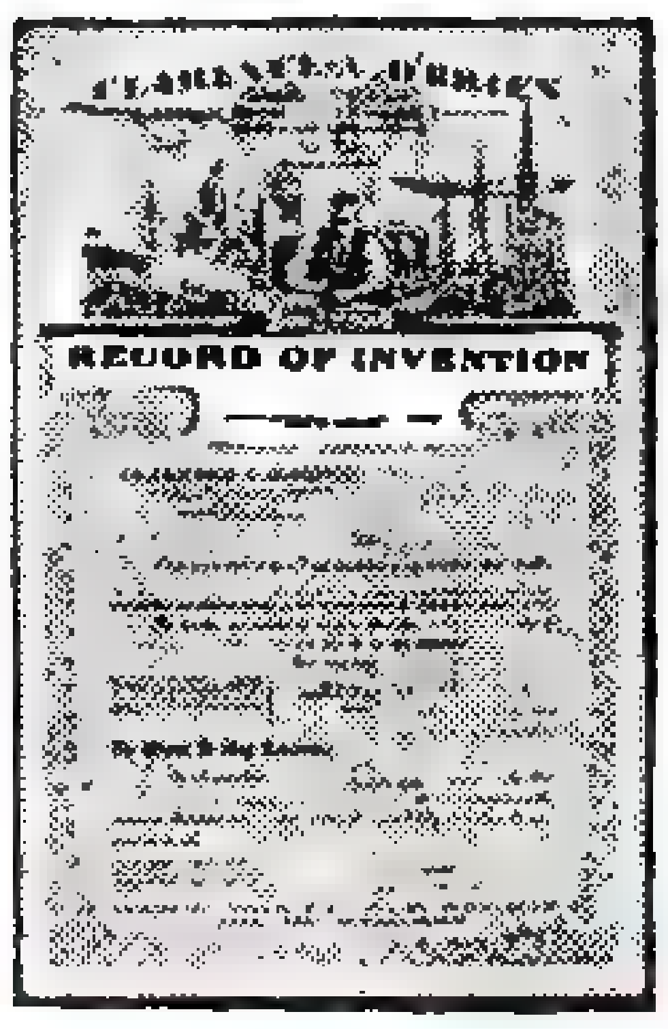

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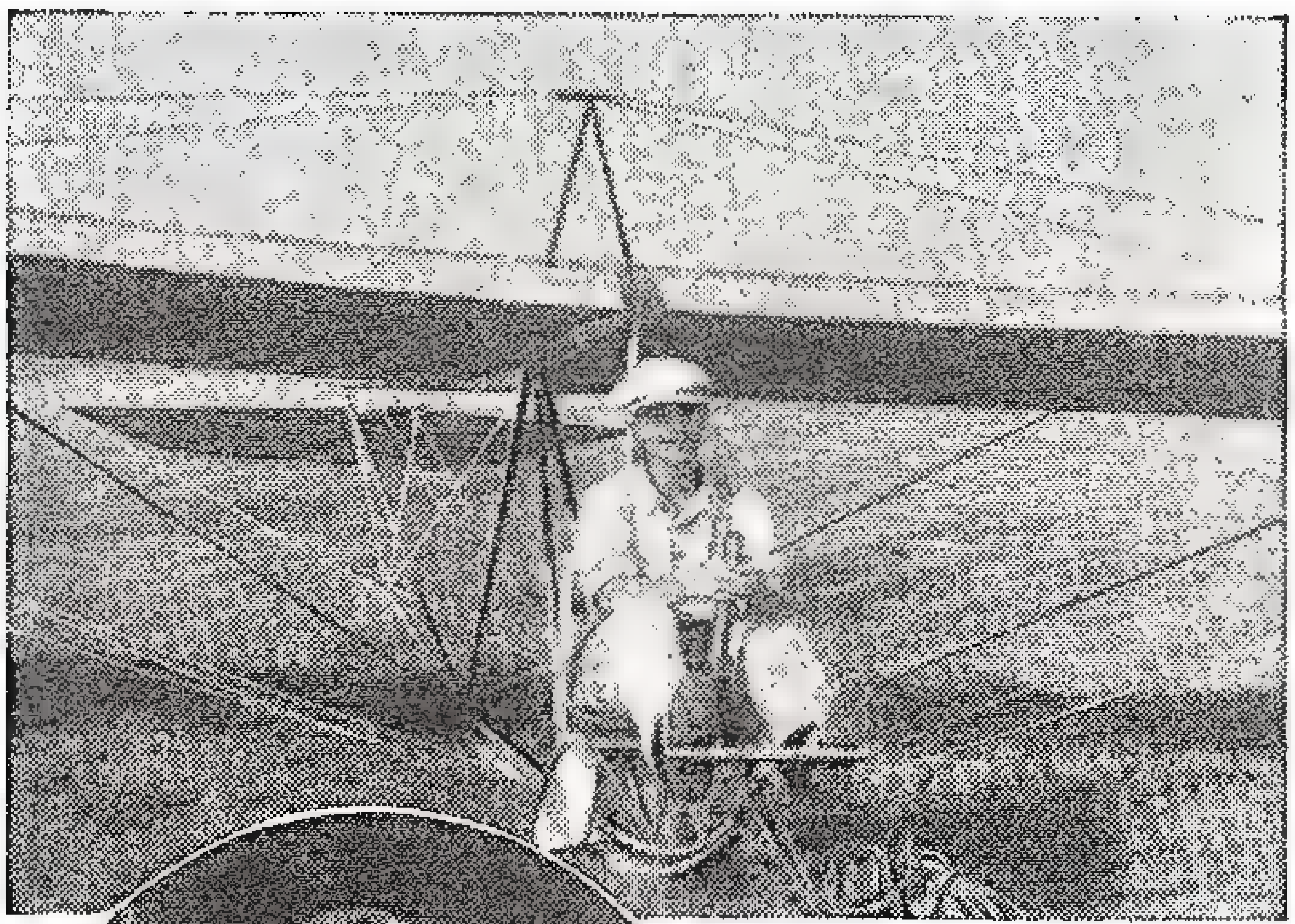
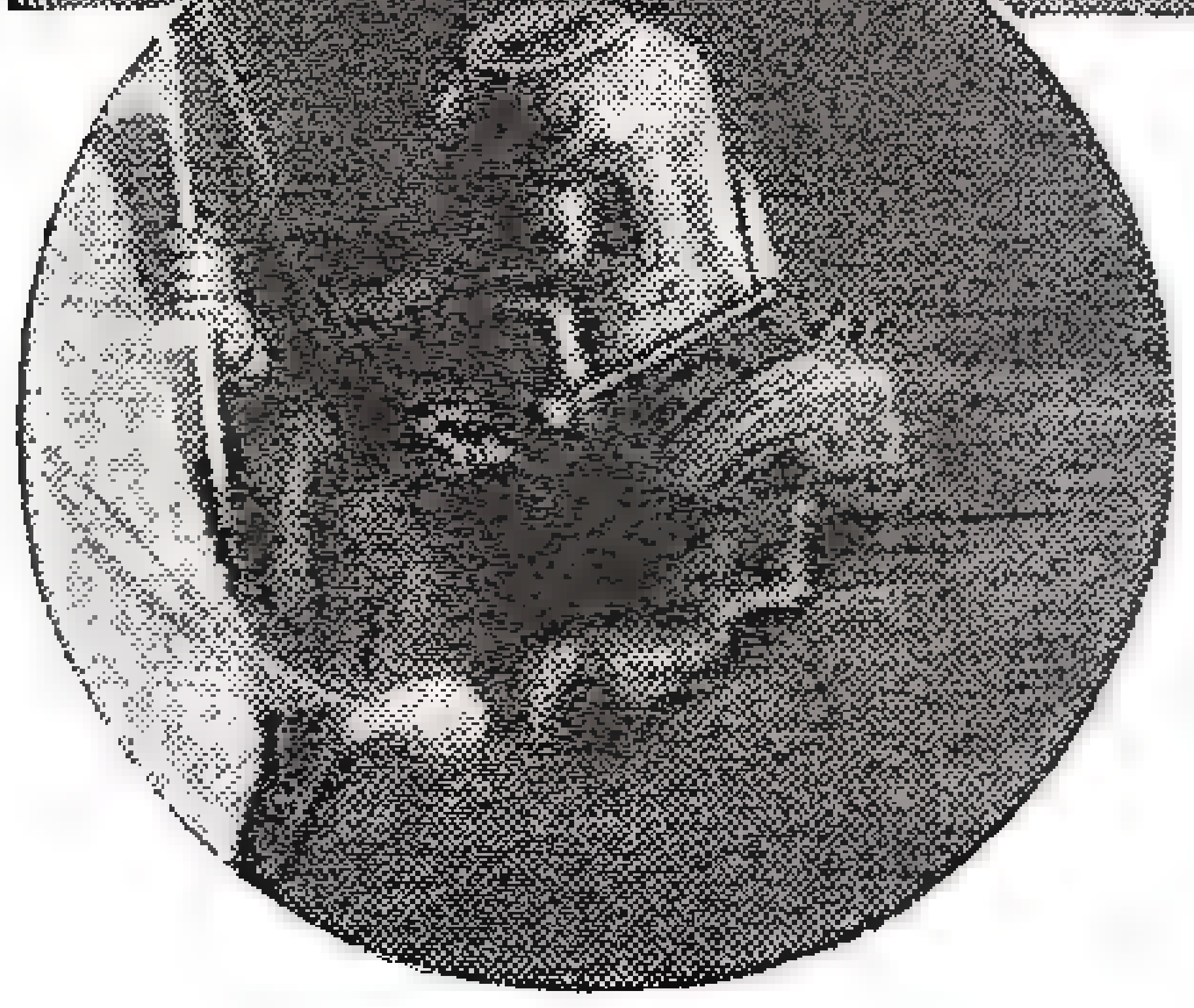




At left is Howard Johnson in the "ready-made" suit and the homemade diving helmet, in which he and his partner explored a river's bottom seeking gold nuggets. Johnson has also gone adventuring in the air. He has flown several planes and built three gliders, one of which is shown in photo above.

IN A 26-page hand-written letter the editor this month received one of the most interesting stories of adventure and humor that has ever come to the Workbench from a reader. It was written by Howard Johnson, of Turlock, Calif., whose adventures have carried him under water in search of gold and in the air seeking thrills. Johnson gets this month's first prize of $5.00. In our limited space we'll try to quote the best parts of his letter.

Turlock, Calif.

Dear Editor:

I am sending some snapshots for the Workbench contest. The diving suit was made by Arlis Riggs. The suits were purchased for $7.50 apiece. He made the helmets from the ends of an automobile gas tank.

We got the air check valve turned around backwards on one of the helmets and built up the air pressure in the suit until the fellow who was trying to go down was floating with his whole chest out of the water.

The suits were used to help get gold out of some deep water holes in a deep canyon. (Johnson explains that the diver went down with a suction hose through which gravel was drawn to a sluice box on a raft where the gold was separated.) We got started into the hills early in the summer, but it was late fall before we got the outfit working right. The whole thing was given up and we went to sluicing the gravel bars by hand.

We had some thrilling times though. I was the first one to try the suits on. I went down into the river about ten feet and thought I was on the bottom. I took two steps when I fell about ten feet straight down. I thought I was surely on the bottom then and started to wander around when I tripped and fell head first for about another ten feet. Boy, was I scared! The boys at the top tried to pull me up, but the safety rope caught on a rock. The one working the air compressor got scared and stopped pumping to help the other fellow pull. I finally managed to work down the river where they could pull me out.

I stayed until it got cold and then came down into the valley for the winter. The other fellow figured that if there was gold below the rapids it had to come through them. He worked right down inside of the rapids and cleaned out all the pot holes and made pretty good. He brought home some pretty good sized nuggets that would have started a gold rush if the miners knew about them.

I am interested in aviation also. The third glider I built performed quite well. The fellow who made the mining outfit bought a long wing biplane. He had the ship on one side of a ditch in a field and wanted to get it around to the back of the building where he could work on it. He hitched a team of horses to it and, when they looked back and saw the plane following them, they ran away and piled it up in the ditch.

I am going to make a parachute jump the first time I run across a good 'chute packer. If it don't open I'll make him let me try it over again.

Howard Johnson.

* * *

The model builders are represented this month by some excellent examples of their craft. Among them the scale model Monocoupe airplane, described in the 1935 "How to Build It," brought second prize of $3.00 to Edward Costello, who says:

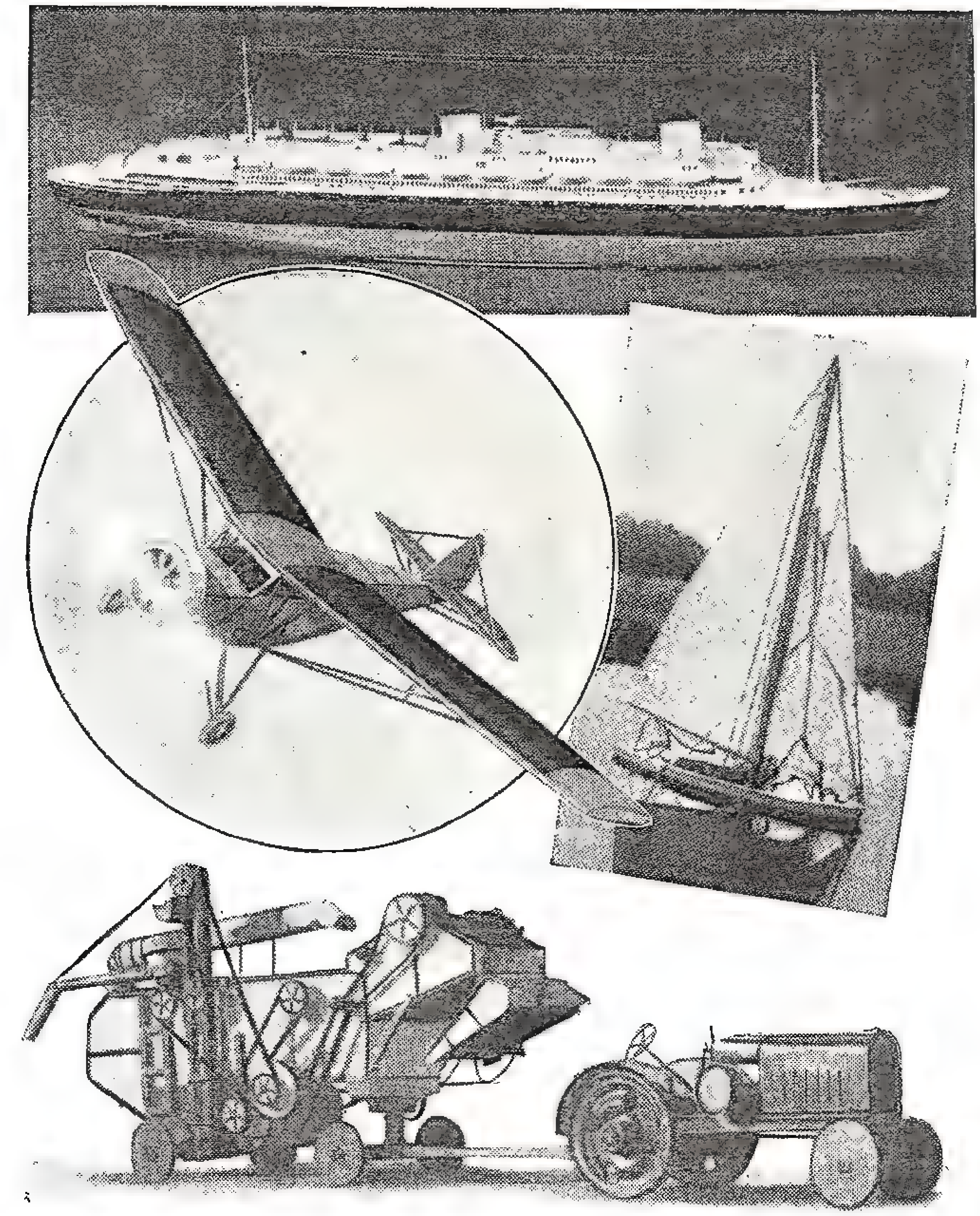
Princeton, N. J.

Dear Editor:

Congratulations on your model airplane plans. I followed the plans and have won two contests already. The Monocoupe flew 200

the Editor's Workbench

Howard Johnson's 26-page letter of adventure as an underwater gold miner wins first prize this month. MM model builders come through with excellent work and an MM design wins two midget plane contests.



The scale model Monocoupe plane won two contests for Edward Costello. It also brought him second prize of $3.00 in the Workbench contest. The fine scale model of the liner Bremen (at top), built by R. W. Dishong, is powered with an auto horn motor. George Cooper built the 18-inch sailing model, while Otto Tandberg built the model threshing machine and tractor.

feet the first time and it wasn't all wound up.

Please bring on some more plans like the Monocoupe. I think all of the model builders will appreciate them very much.

Edward Costello.

* * *

That fine reproduction of the liner Bremen was built by R. W. Dishong. Here's what he says about it:

Johnston, Pa.

Dear Editor:

Enclosed I am sending a photo of a model I built of the Bremen. This model is 41 inches long, being built on a scale of one-twentieth of an inch. It is powered by an automobile horn motor and four flash light batteries. I procured the plans from the North German Lloyd Line and every part of it is built to scale. The model makes fairly good speed and looks like the real thing when under way.

R. W. Dishong.

* * *

What type of models do MM readers prefer? The field is unlimited; there are modern racing sail boats and liners, steam and electric type locomotives, gasoline or rubber powered airplanes, and historical models of all kinds. Just address a card to the Workbench and the biggest demand will be filled with how to build plans in MM as soon as possible.

Here, for instance, is Otto Tandberg who goes in for models of farm machinery.

Dear Editor: Leeds, N. D.

I am sending you a couple of pictures of some of the models I have made. I have seen many pictures of models of trains, boats, and airplanes, but none of tractors or threshing machines.

Otto Tandberg.

* * *

We had space for only one picture of George Cooper's racing sail boats, but here is his letter about them:

Dear Editor: Waltham, Mass.

Here are some pictures of two boats I built.

[*Continued on page* 20]

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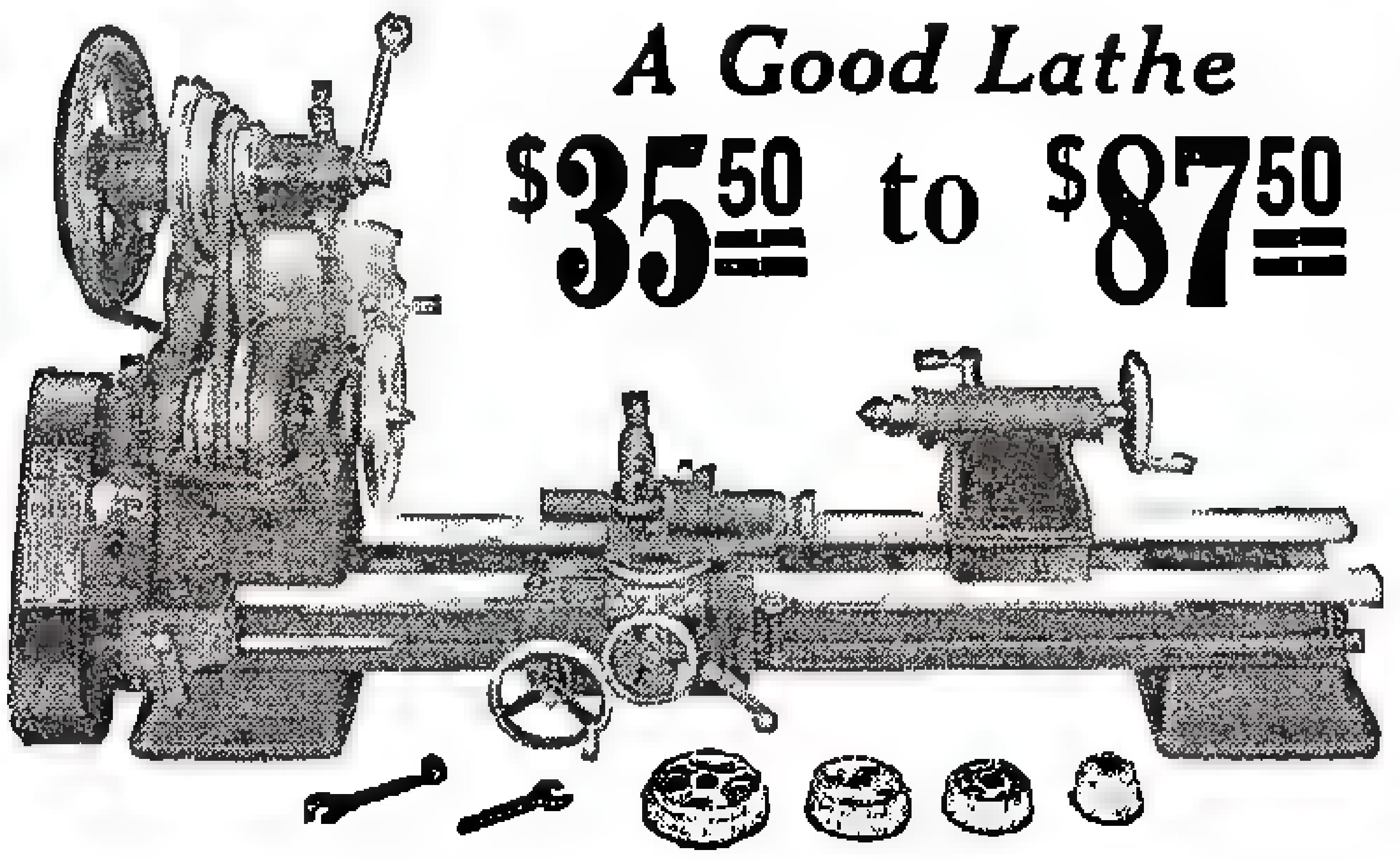

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Chips from the Editor's Workbench

[*Continued from page* 19]

This enlarged Tar Baby, built by Jack Voll's father, won third prize.

One is 18 inches and the other is 36 inches. I built the 36-inch boat from drawings I made after studying pictures of "Enterprise." Of course, it is not true to scale, but a sailing model.

George Cooper.

* * *

Third prize of $2.00 this month went to Jack Voll whose letter follows:

Manette, Wash.

Dear Editor:

Enclosed find a picture of a MM "Tar Baby," which my dad built for me. It is longer and wider than the original (length 9' 4", width 4') but the same proportion. The sail is 12 feet high with a 7-foot boom. It is a very good sailor and rower. We are now planning to build a midget car and will send you a picture of it as soon as it is finished.

Jack Voll.

Much as we dislike to see dimensions changed on MM's tested boat designs, we have no objections as long as the builder is satisfied.

* * *

Many of the photos that come to the Workbench would win prizes if the readers would tell more about themselves, the things they are building, and what they would like to see in MM. Remember this is a department for readers only and you are the ones who make it interesting. Of course, we don't expect a 26-page letter, such as Howard Johnson wrote, from every one of you, but we wouldn't mind seeing one once in a while.

* * *

James G. Robichaud gives us a pretty good idea on how to build a wind generator in this letter.

Tracadie, N. B.

Dear Editor:

Here is a snapshot of my wind-electric

[*Continued on page* 22]

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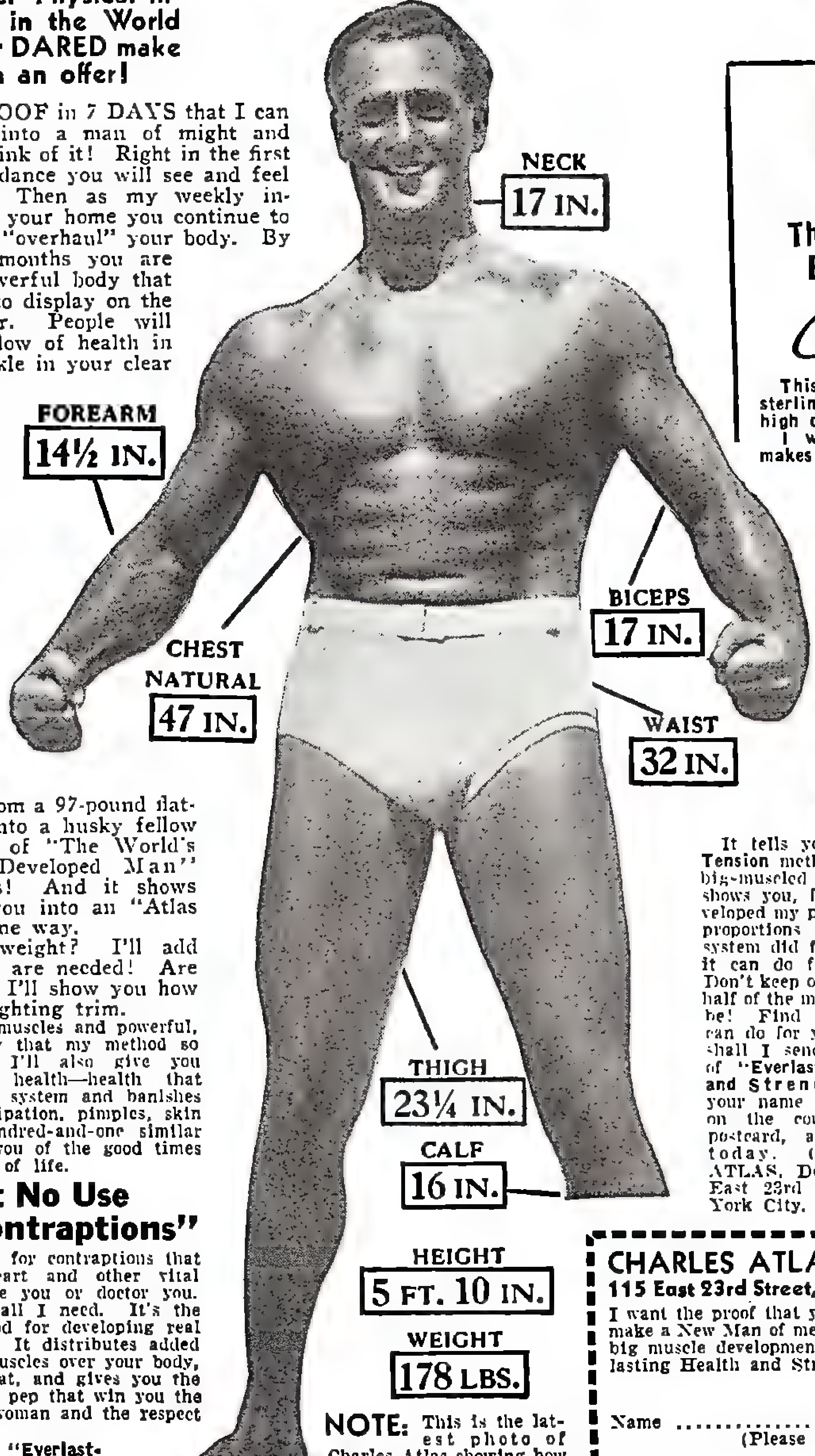

I'LL give you PROOF in 7 DAYS that I can turn you, too, into a man of might and muscle. Just think of it! Right in the first week under my guidance you will see and feel the improvement! Then as my weekly instructions arrive in your home you continue to rebuild, renew and "overhaul" your body. By the end of three months you are the owner of a powerful body that you will be proud to display on the beach this summer. People will notice the ruddy glow of health in your face, the sparkle in your clear eyes, your broad shoulders, and they will seek your company. You will be the fellow who will walk off with the prettiest girl and the best job while the others wonder how you did it!

Write your name and address carefully on the coupon below. I'll send you absolutely free, a copy of my new book, **"Everlasting Health and Strength."** It reveals the secrets that changed me from a 97-pound flat-chested weakling into a husky fellow who won the title of "The World's Most Perfectly Developed Man" against all comers! And it shows how I can build you into an "Atlas Champion" the same way.

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Get my free book, **"Everlasting Health and Strength"**! Mail my coupon today. Gamble a stamp to prove I can make YOU a new man!

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NOTE: This is the latest photo of Charles Atlas showing how he looks today. This is not a studio picture but an actual untouched snapshot.

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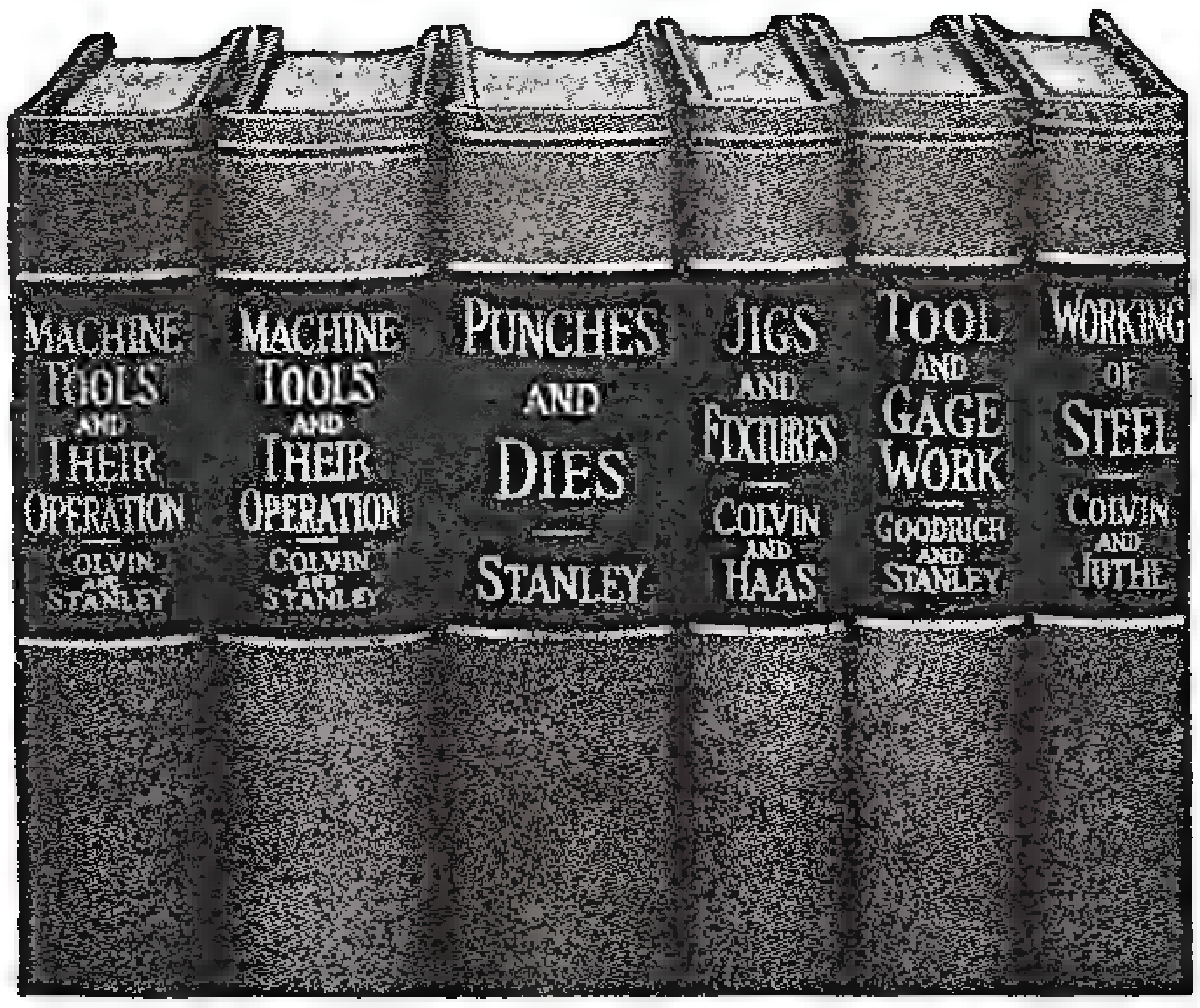
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Chips from the Editor's Workbench

[*Continued from page 20*]

Here is James Robichaud and his wind generator. A bicycle wheel supplies pulley drive to charger.

battery charger. This is a new type of my own design and although it may look bulky, it has plenty of speed and power. The eight-bladed fan is made of galvanized sheeting with a 6 by 5-inch hardwood block for the hub. A bicycle wheel at the other end of the shaft and a 13-inch flywheel in the middle completes the job except for the turn-table which is made by driving a piece of pipe into a block nailed to the bottom of the base. Slip a washer over the pipe, which is placed in a hole drilled in a post. The vane should be about 2½ feet long. An old car generator is all you need to keep the batteries charged.

James G. Robichaud.

* * *

At last MM's light plane fans are getting a break. Next month we will have one of the finest gas-powered model planes ever published. Its trim appearance is revealed in the photograph on page 5.

April Puzzle Contest Winners

ALERT contest entrants found that there were 3,468 different ways, backwards and forwards, diagonally, and up and down, of spelling the word REDDER in the first problem.

Exactly eleven acres is the area of the inner triangle of land surrounded by the three square fields in problem number two.

There were many possible versions of the coded message. Here is one: "I understand that in 1797 France was engaged in a civil war. Religion was wiped out, laws were set aside, monarchy was overthrown, and rebellion was in every corner."

To 18-year-old Robert Bradley goes first prize of $10. He is a senior in high school at Schenectady, N. Y.

Second prize of $5 was awarded Czar J. Dyer, Ann Arbor, Mich. Four third prizes of $2.50 each were won by Ralph I. Miller, W. Catasauqua, Pa; Ramona M. Santmier, Woonsocket, R. I.; G. J. Leuty, Knoxville, Iowa, and Ernest Berkel, Selfridge Field, Mich.

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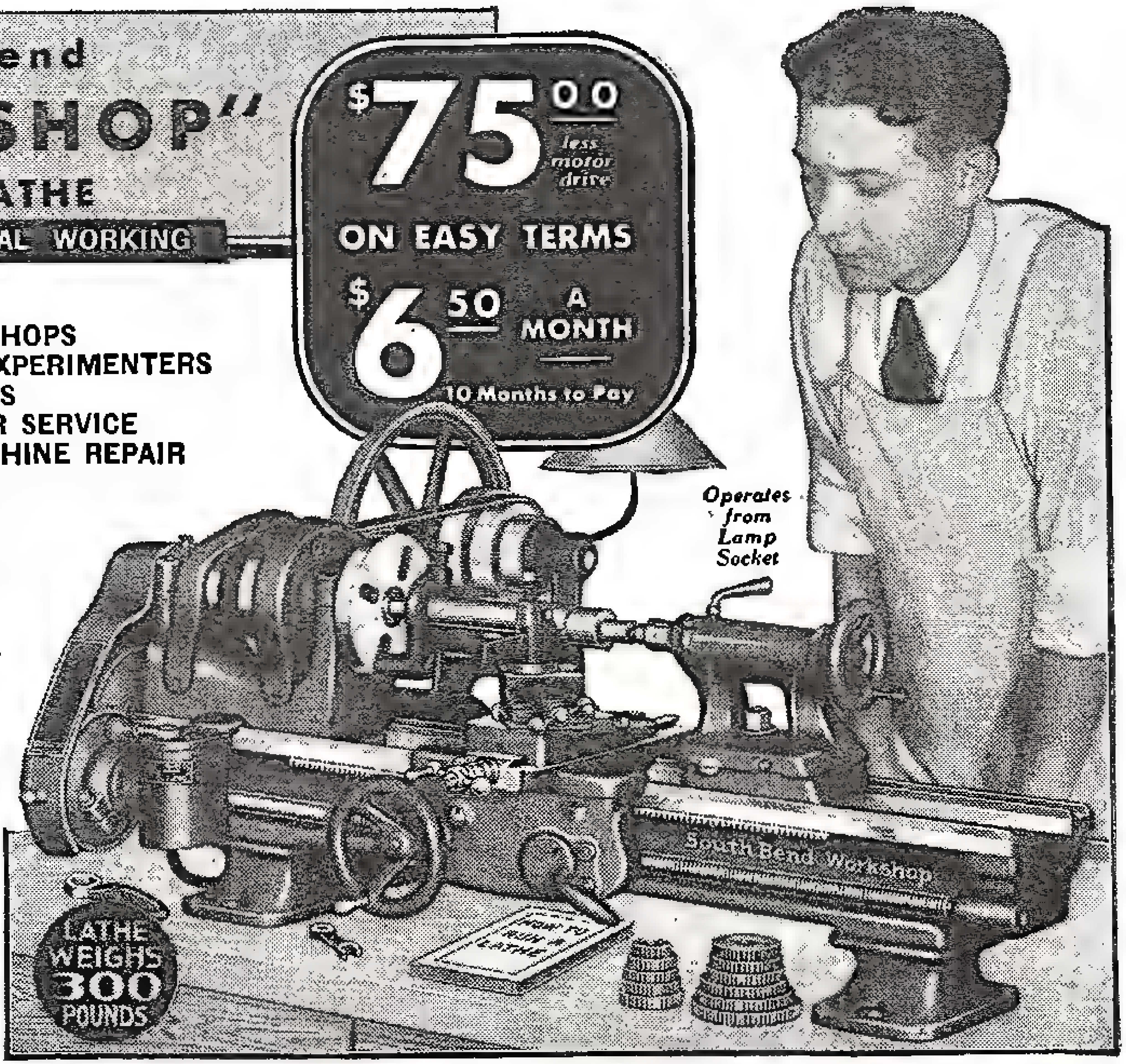

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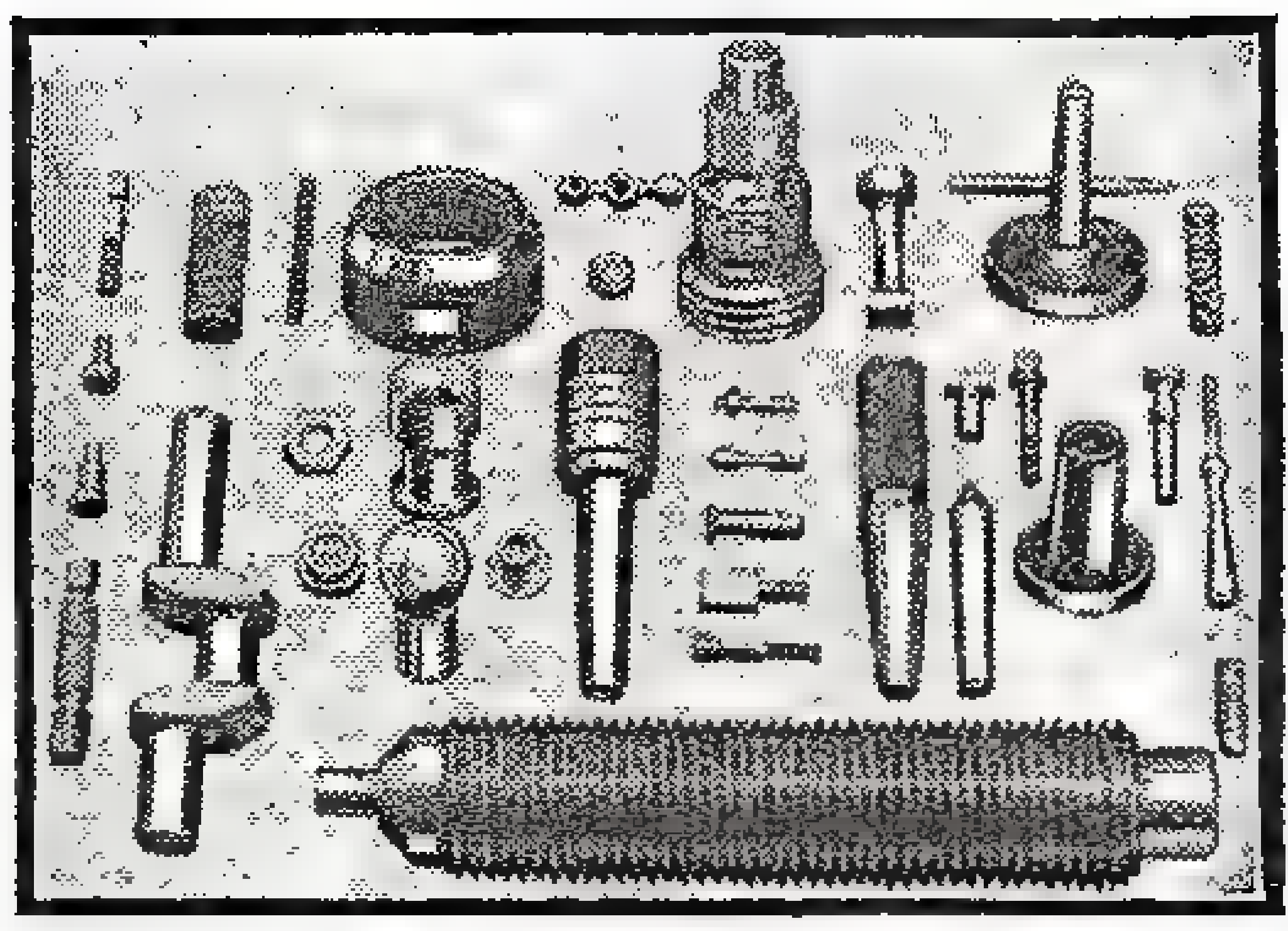

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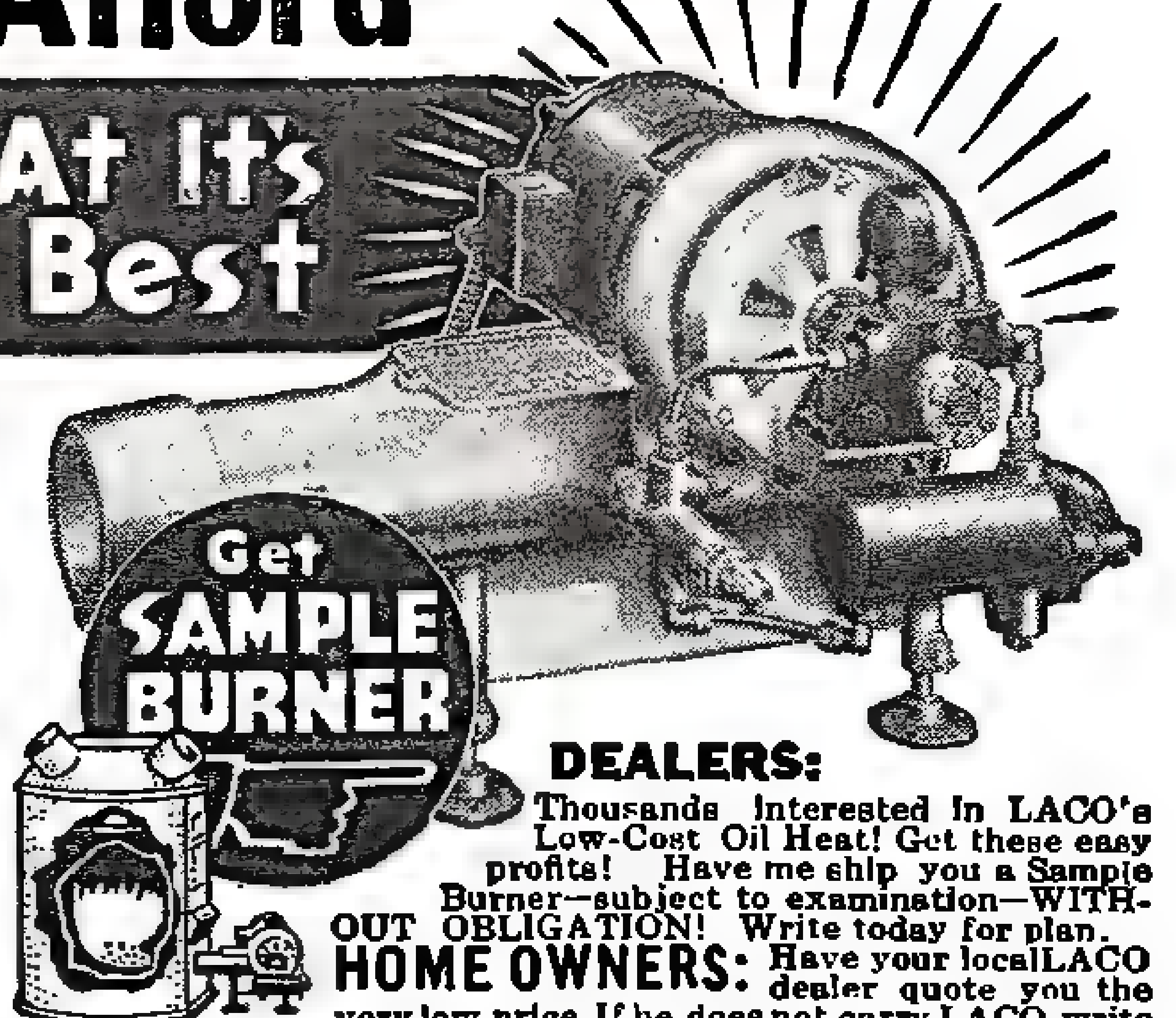

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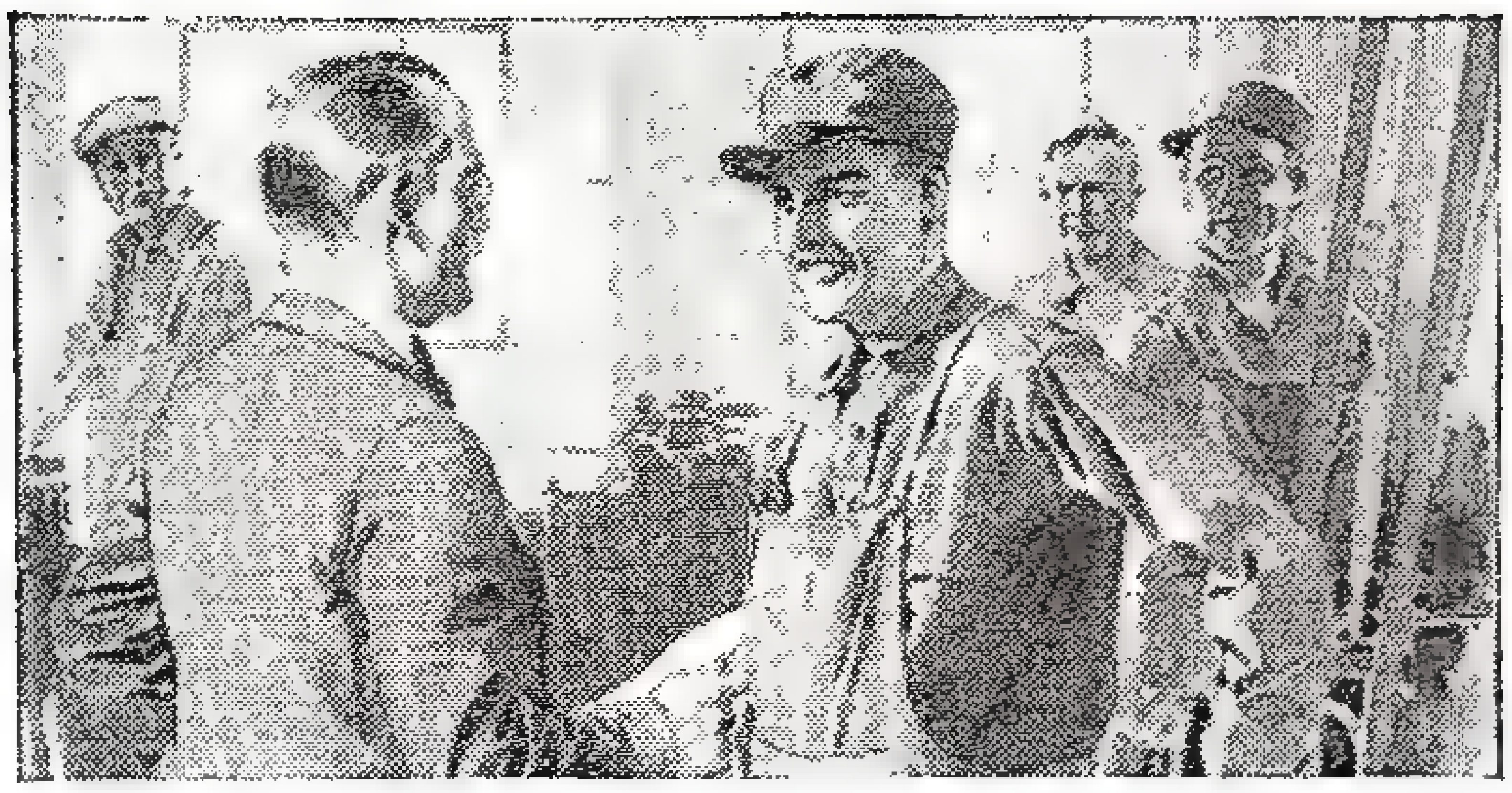

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Problems Editor Answers Queries

[*Continued from page* 16]

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WHAT LUMBER FOR BOATS?

Mahogany wood is too expensive in my locality for boat building; can you suggest some substitute woods which are suited for small boats?—M. J., Cheyenne, Wyoming.

Although mahogany is best for boat planking, any coniferous wood, such as the different varieties of pine and spruce, are being used with success. The frames of boats can be made with mahogany, oak, yellow pine, or spruce. Boats less than 12 feet long are often constructed entirely of white pine.

ESTIMATING WIND VELOCITY

How can I estimate wind velocity without purchasing an expensive anemometer.—S. M., Boston, Mass.

Smoke will rise vertically when the wind is less than one m.p.h., and will drift lazily at from one to three m.p.h. Light winds of four to six m.p.h. are felt on the face, and will rustle leaves. A breeze of from seven to twelve m.p.h. keeps light flags in motion, and moves leaves steadily. Branches are moved and dust raised by 13 to 18 m.p.h. winds. Small trees bend slightly before 19 to 25 m.p.h. winds, while large branches move at around 30 m.p.h. Whole trees are in motion, and walking becomes difficult, when the wind speeds up to around 35 m.p.h. A gale, from 39 to 44 m.p.h., will break twigs off trees, and stronger winds will uproot trees and damage buildings. By checking your estimates occasionally against official weather report data, you can develop the ability to tell wind velocities by feel and sight alone.

LIFTING MAGNETS

What determines the lifting power of an electromagnet?—S. R., Atlanta, Ga.

The product of the number of turns in the coil, and the current in amperes passing through the coil, is an indication, within certain limits, of the strength of an electromagnet. A ½" diameter soft iron core with a 300-ampere turn coil is the minimum for lifting ten pounds. It is usually necesary to experiment with the number of turns and the d. c. voltage used, in building an electromagnet for a definite purpose. Low current with a large number of turns is just as efficient as high current with fewer turns in the coil.

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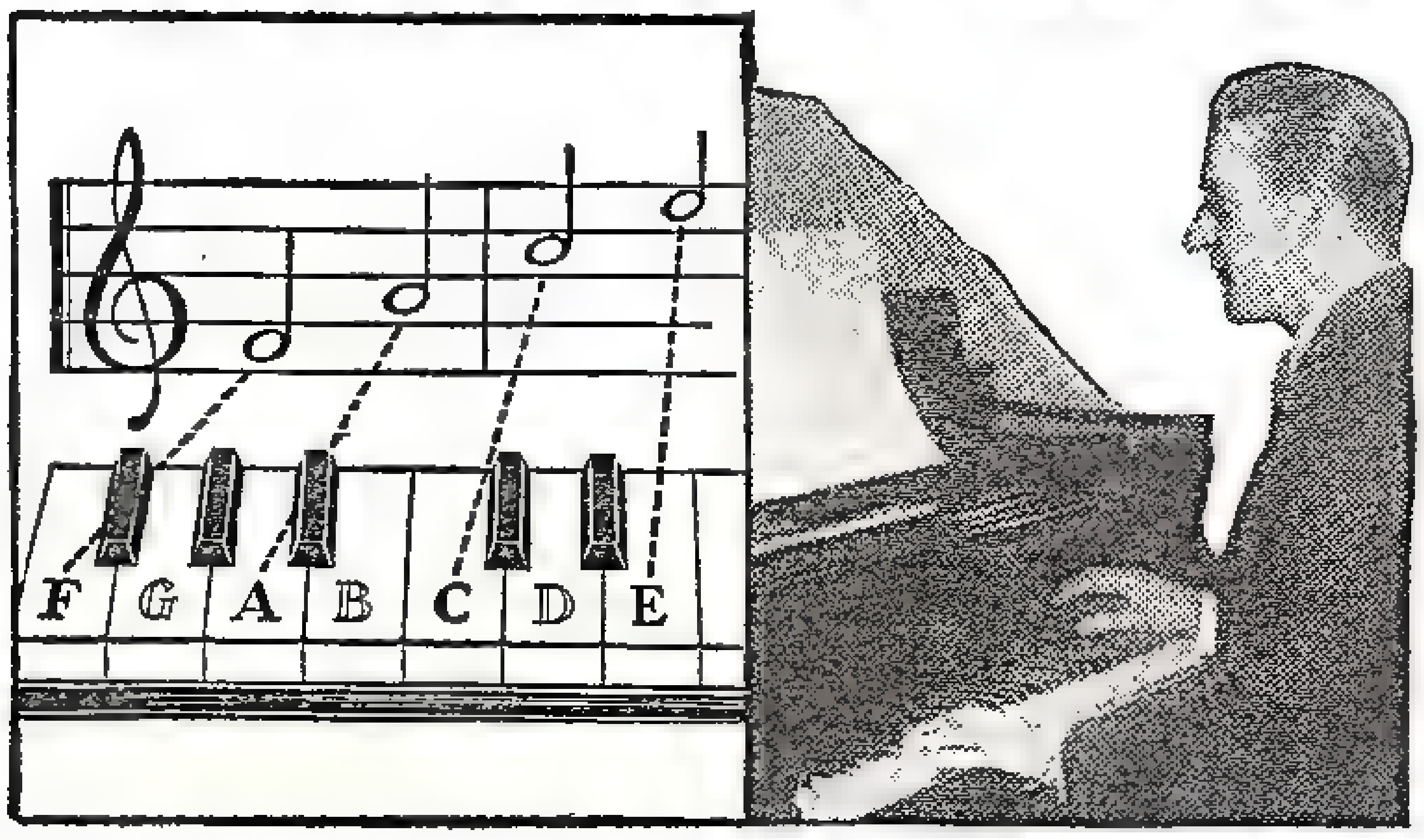

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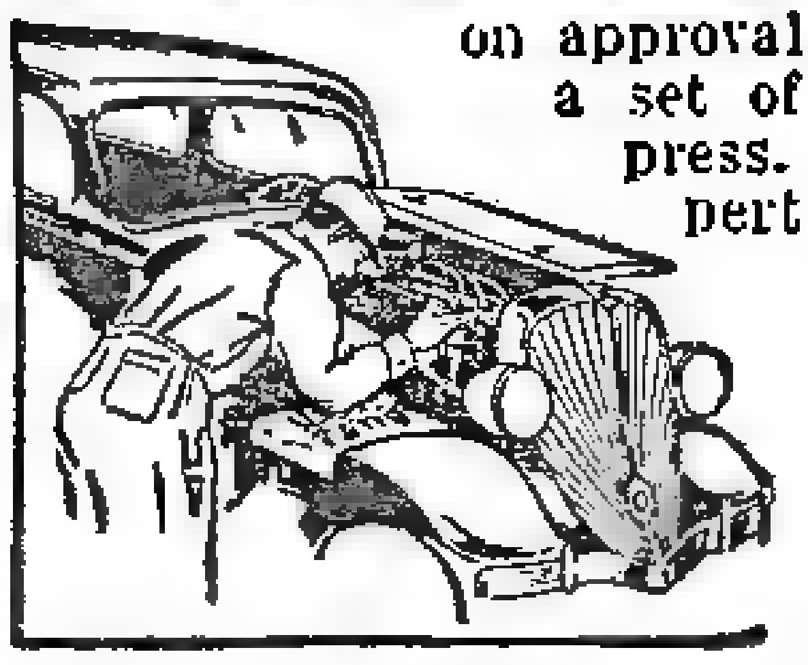

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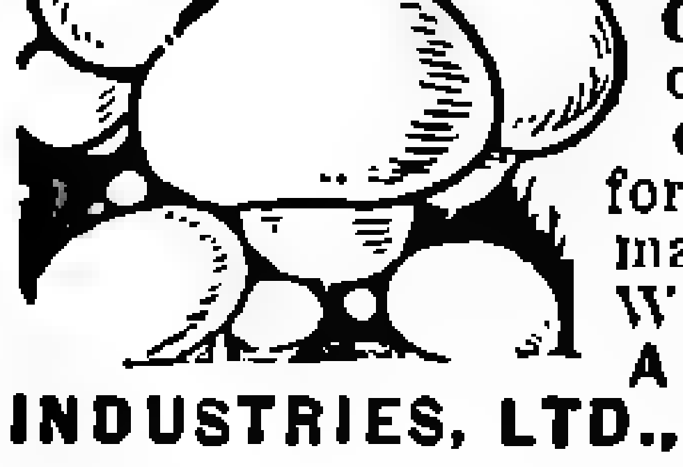

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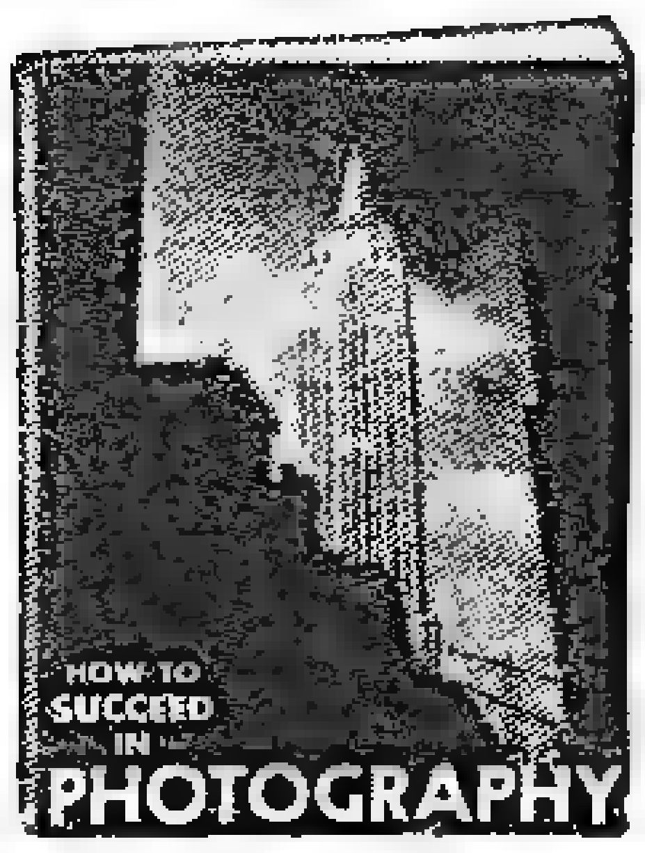
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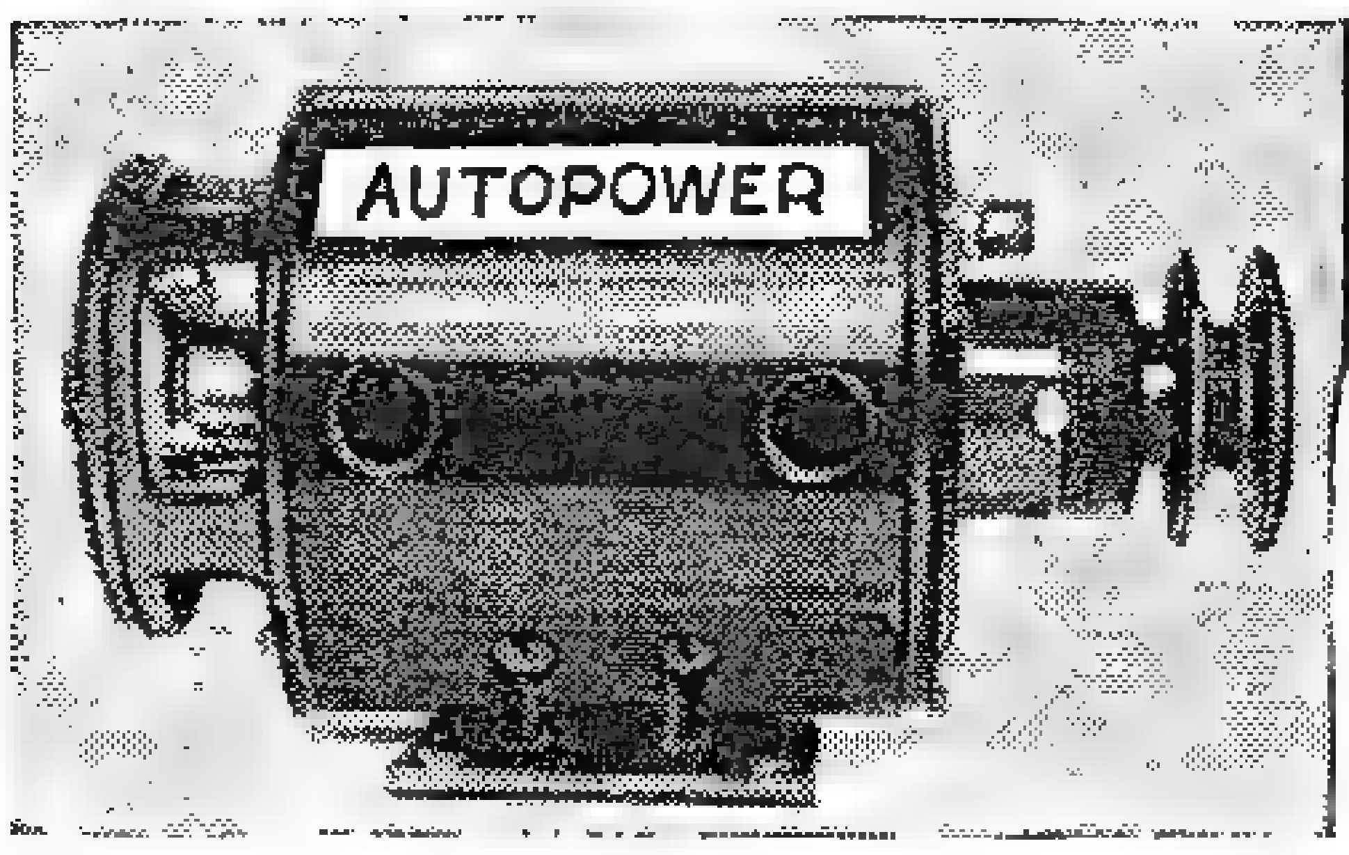

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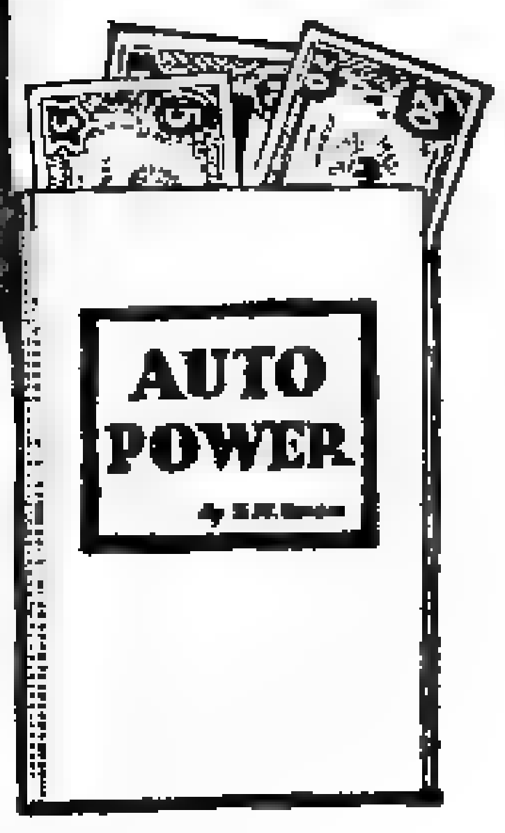

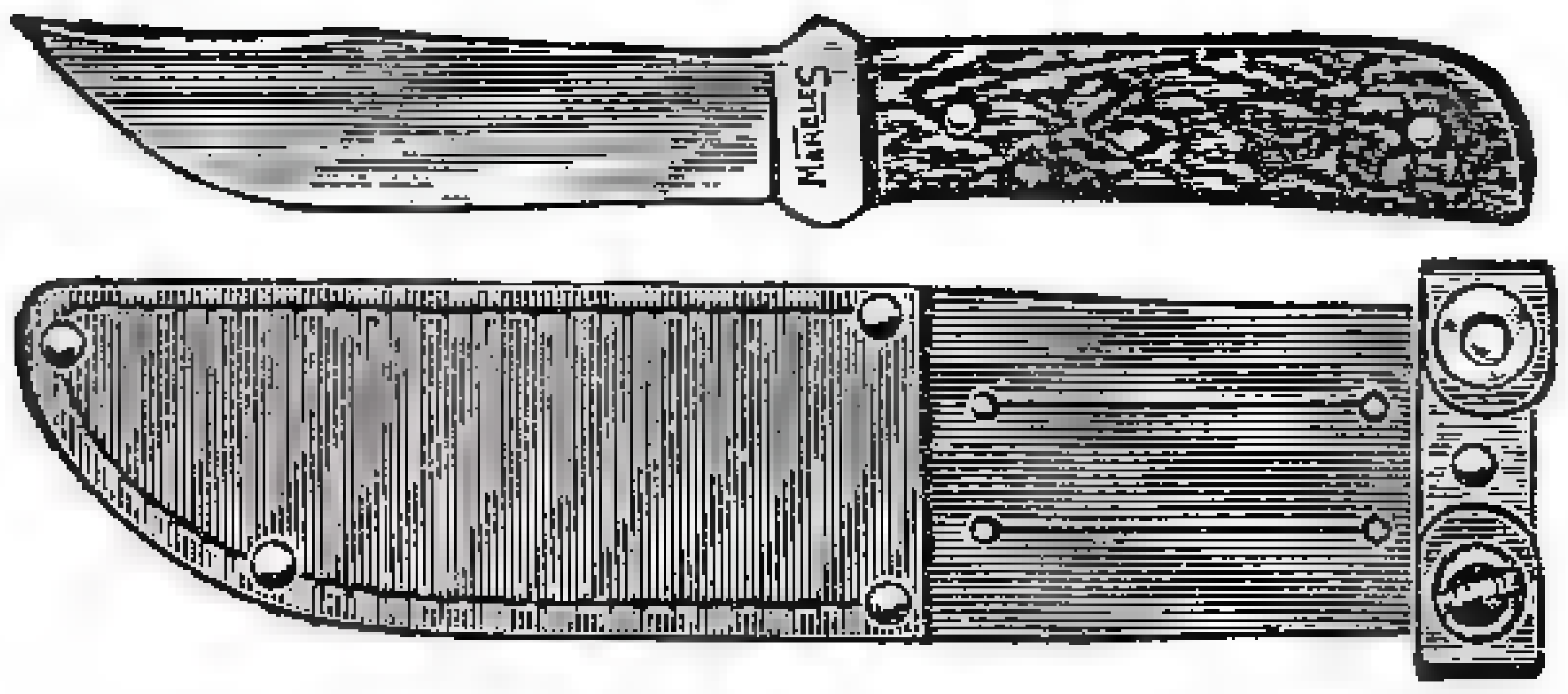

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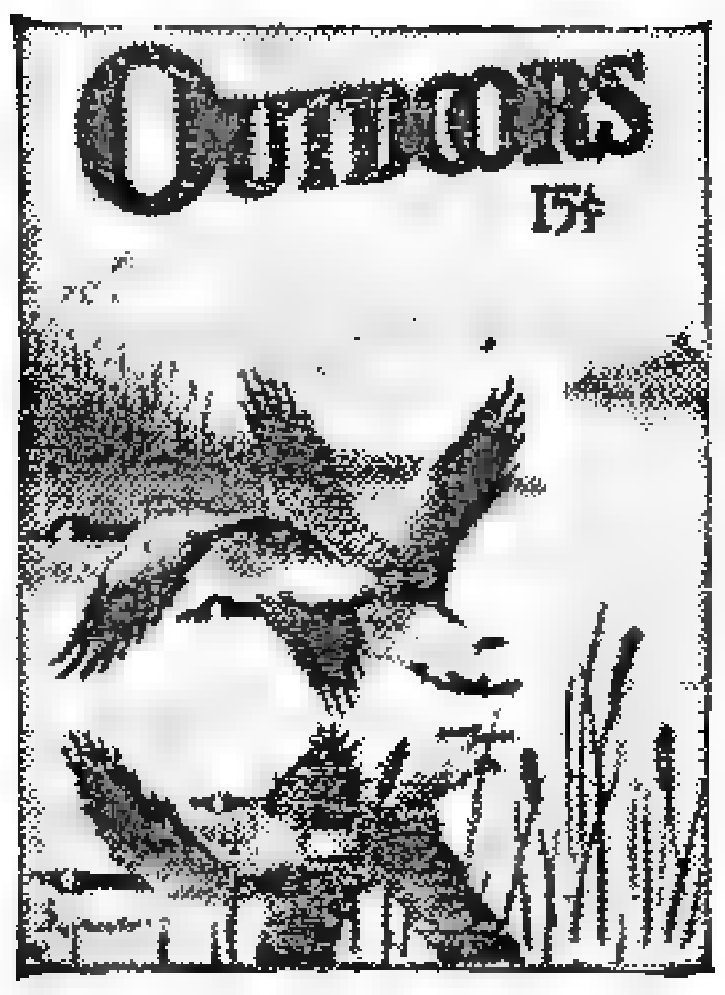

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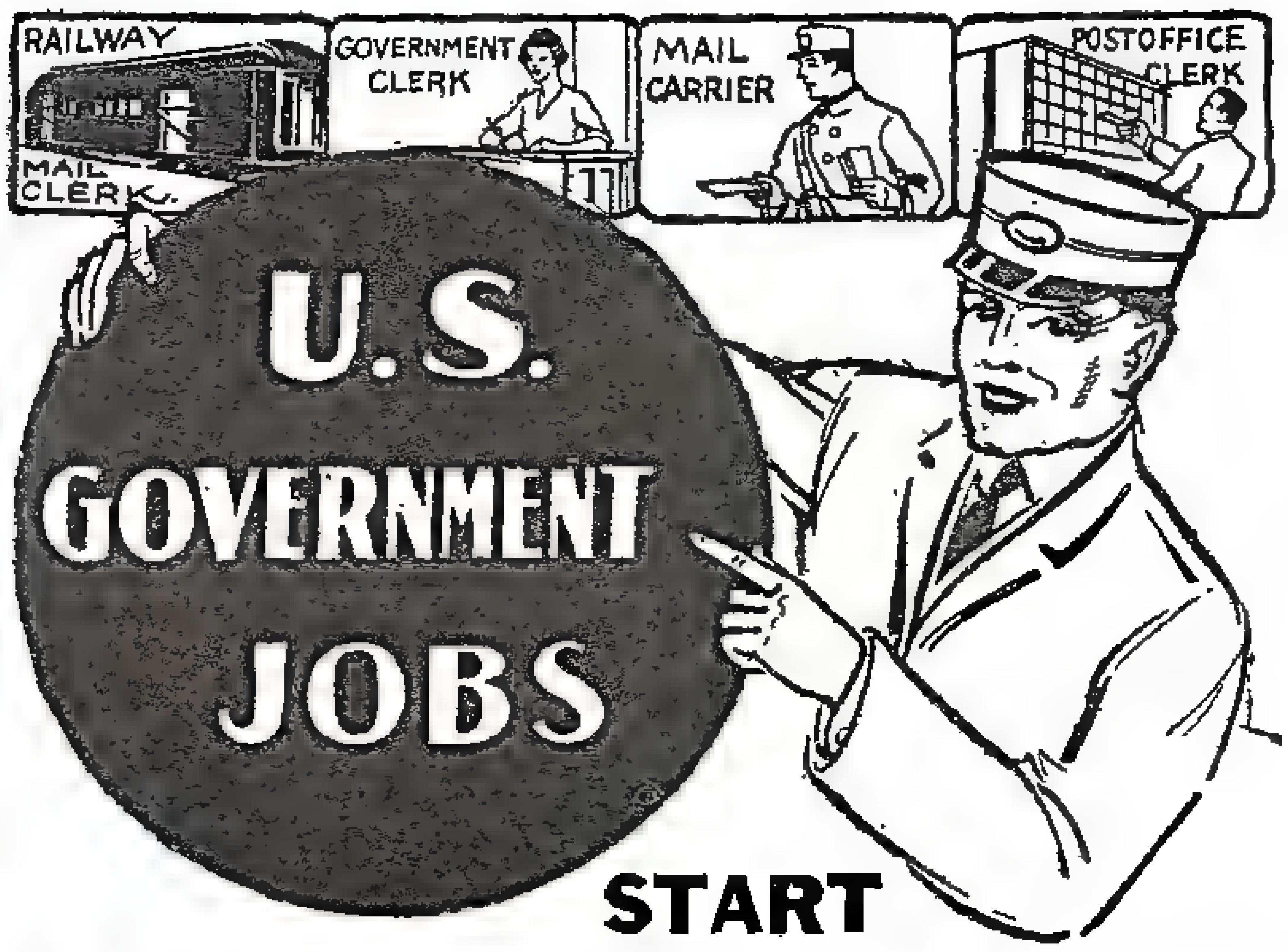

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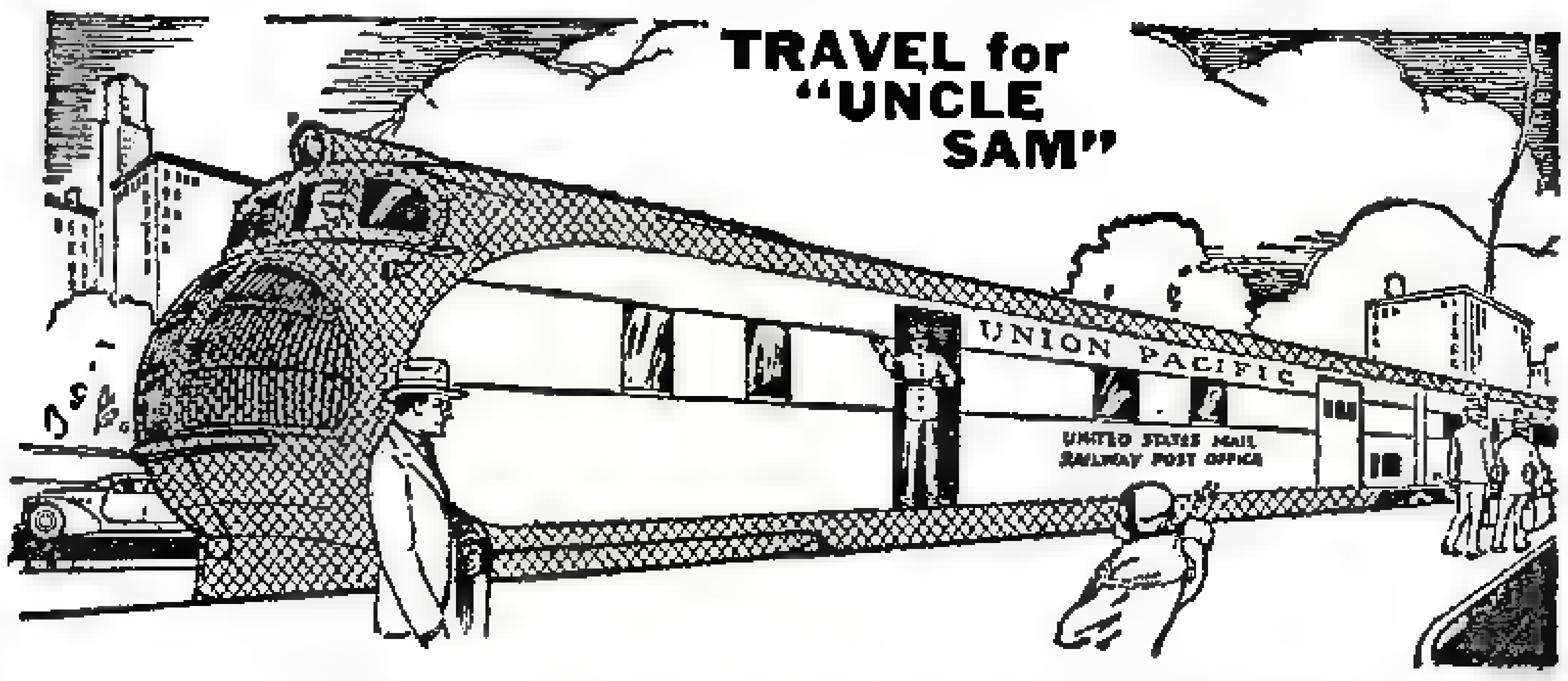
Railway Postal Clerks get $1,900 the first year, on regular, being paid on the first and fifteenth of each month. ($79.17 each pay day.) Their pay is quickly increased, the maximum being $2,700 a year. ($112.50 each pay day.)



TRAVEL for "UNCLE SAM"
UNION PACIFIC
UNITED STATES MAIL RAILWAY POST OFFICE

3 Days On—3 Days Off—Full Pay

Railway Postal Clerks on long runs, usually work 3 days and have 3 days off duty or in the same proportion. During this off duty their pay continues just as though they were working. They travel on a pass when on business. When they grow old they are retired with a pension.

City Mail Carriers, Post Office Clerks

Clerks and Carriers now commence at $1,700 a year and automatically increase $100 a year to $2,100 and $2,300.

Customs and Immigrant Inspector

Salary $2,100 to start. Men 21 to 45. Work connected with examining immigrants and merchandise entering the country from foreign parts.

You Can Get Them

Experience is usually unnecessary and political influence is not permitted. Let us show you how to get a government job.

Get Free List of Positions

Fill out the following coupon. Tear it off and mail it today—now, at once.

This investment may result in your getting a life big-paid government job.

FRANKLIN INSTITUTE, Dept. S-306, Rochester, N. Y.

Rush to me entirely free of charge (1) a full description of the position checked below; (2) Free Copy of 32-page book, "How to Get a U. S. Government Job"; (3) A list of U. S. Government Jobs; (4) Tell me how to get a Government Job.

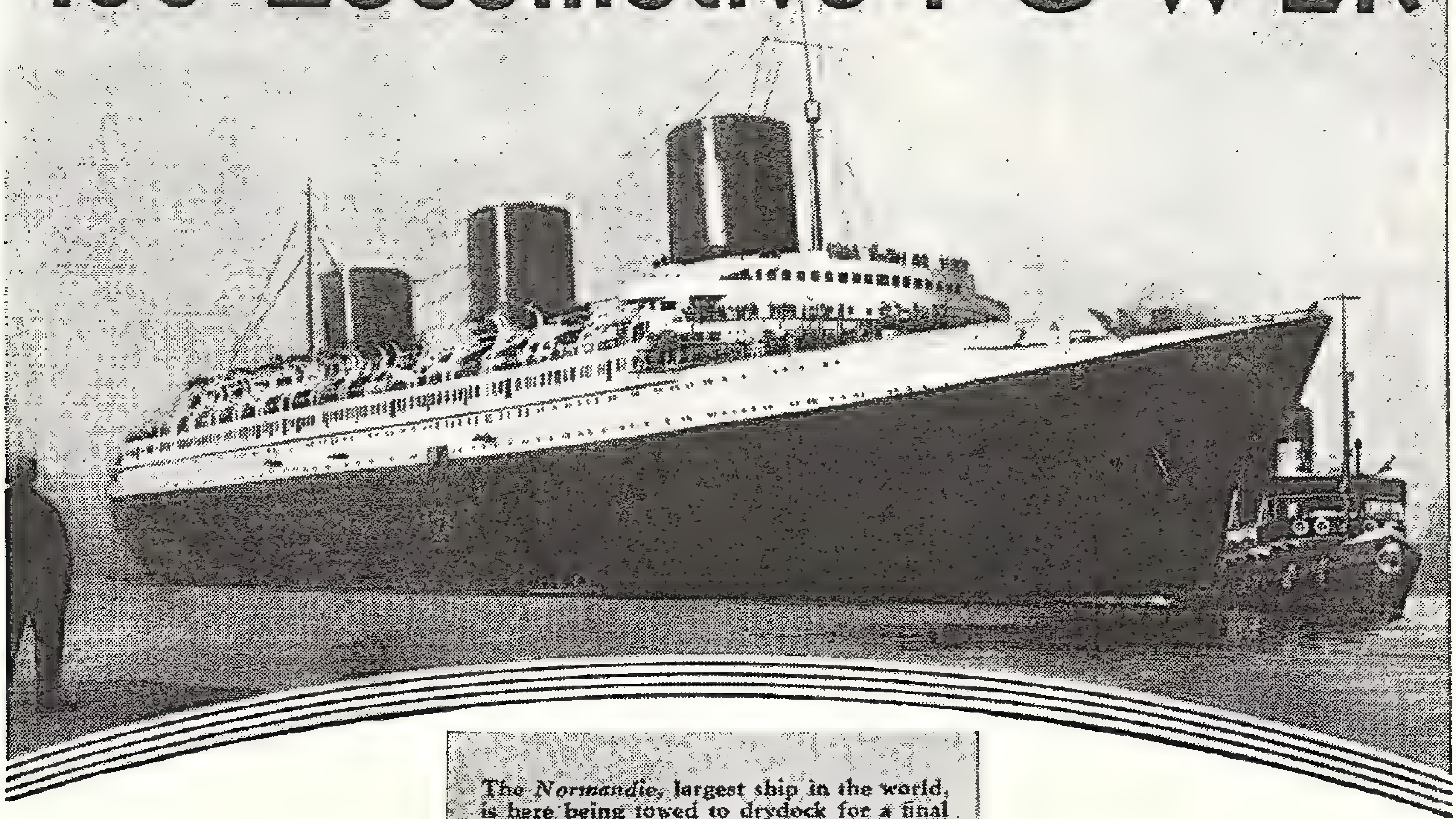
☐ Railway Postal Clerk ....(Start $1900 year)
☐ Post Office Clerk ....(Start 1700 year)
☐ City Mail Carrier ....(Start 1700 year)
☐ Office Clerk—File Clerk ....(Start 1260 year)
☐ Inspector of Customs ....(Start 2100 year)
☐ Immigrant Inspector ....(Start 2100 year)

Name ....

Address ....

Use This Coupon Before You Mislay It

100 Locomotive-POWER



The Normandie, largest ship in the world, is here being towed to drydock for a final overhaul and attachment of propellers. Note the curved bridge with wings.

ACROSS the Atlantic at express train speed plows the *Normandie,* newly-completed French Line ocean liner, to make a June third appointment at pier 88, gigantic terminal built especially for this queen of the seas at the foot of West 48th Street in New York City.

The *Normandie's* speed of 30 knots is equivalent to almost 35 miles an hour, the speed of the average passenger train. Four monster electric motors develop a total of 160,000 horsepower, equivalent to the combined pulling power of one hundred locomotives. This 1,029-foot ship, the largest in the world, will be able to make the trans-Atlantic crossing in less than five days, even in the stormiest weather.

On the maiden voyage between Havre and New York, the public will be permitted to inspect this magnificent floating city. Then will come regular twice-monthly round trips on a speed schedule never before achieved between the United States and Europe.

Literally a floating electric power plant, the *Normandie* is able to produce enough electricity to supply the entire lighting and power demands of a city the size of Boston. If the output of this power plant were used for other purposes than propulsion of the ship, it would light 5,000,000 ordinary household light bulbs, operate more than 3,000 street cars, supply more than 140,000 first class radio stations, or even, by pumping water continually for a year, lower the level of Lake Michigan ten feet.

The four largest motors ever built, developing 40,000 h. p. each, are mounted directly on the shafts of the four three-leaf, 23-ton screws which will propel the boat.

Completely loaded, the giant liner will displace almost 80,000 tons of sea water. The hull itself weighing about 30,000 tons, required many forgings weighing up to 74 tons each. High-strength steel was used at the vital parts to give the required rigidity with less bulk.

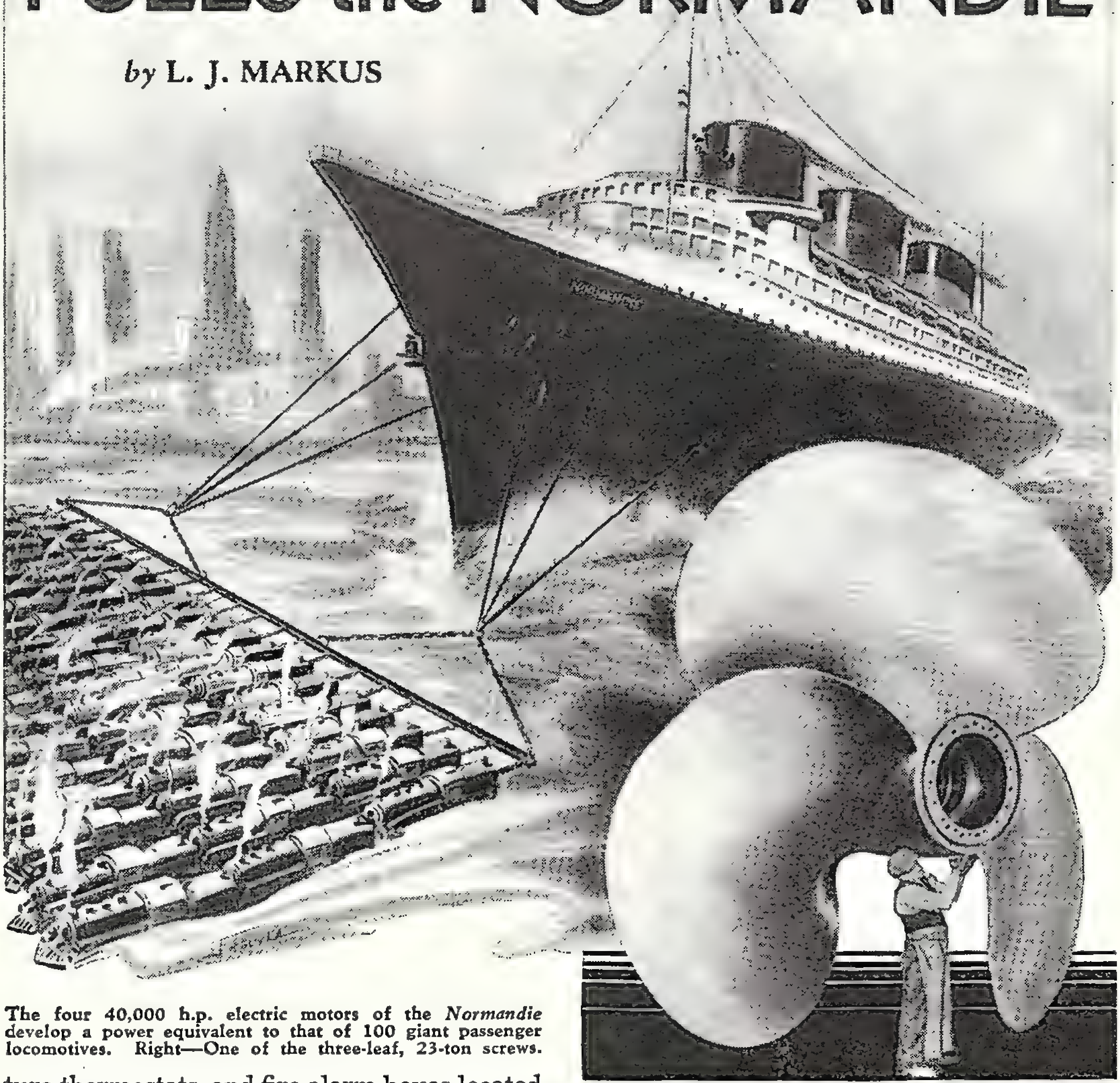
So complete and varied are the facilities awaiting passengers on board the *Normandie* that it would be perfectly possible to spend a lifetime on the water. Medical care, amusements, and sports, as well as food and shelter, are amply provided.

More nearly fireproof than any other ship afloat, the *Normandie* has no fire-detecting or fighting apparatus on the bridge. Instead, a fire department with a staff of twenty-four professional firemen is maintained in the center of the ship, ready to respond to calls from any part of the two-block long vessel.

Smoke-detecting devices, excess-tempera-

PULLS the NORMANDIE

by L. J. MARKUS



The four 40,000 h.p. electric motors of the *Normandie* develop a power equivalent to that of 100 giant passenger locomotives. Right—One of the three-leaf, 23-ton screws.

ture thermostats, and fire alarm boxes located throughout the ship are connected to indicating switchboards in the central headquarters. Another board registers the locations at all times of firemen making regular rounds of inspection of the ship. These men must report every twenty minutes.

Although complete chemical fire fighting equipment is at hand ready for instant use, the Security Officer and his trained men carry out the highly specialized work of combating fires even before the disastrous flames can get a start.

Walls of all cabins are made up of a sheet of duralumin between layers of an asbestos material which is covered with fireproof paint.

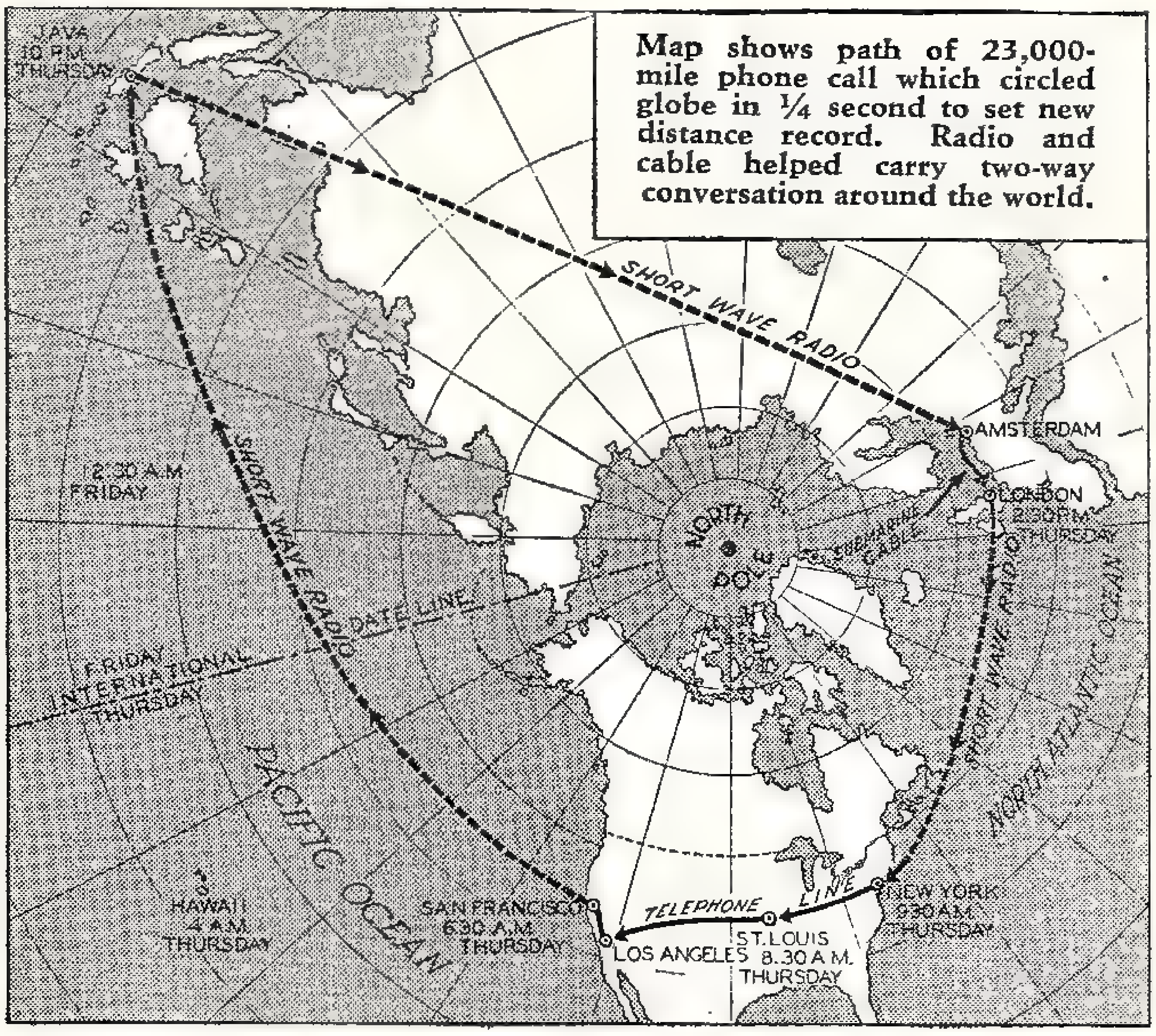
The sounding of a fire alarm will automatically close all ventilators in the section of the ship involved, eliminating fire-feeding drafts. Any one room can be completely flooded by inserting a hose line through an emergency hole in the ceiling, by means of a device invented by Captain Rene Pugnet, the *Normandie's* commander.

Phosphorescent signs throughout the ship will point the way to the life boats even though all the ship's lights fail.

The largest ocean dining room in the world, 300 feet long and three stories high, will always be at the same comfortable temperature, even though it is entirely "inside," with not a window or skylight. Latest American air-conditioning equipment will manufacture its artificial weather. Not a single electric bulb

[*Continued on page* 145]

Earth Circling Phone Call Speeds from Tomorrow into Today



Map shows path of 23,000-mile phone call which circled globe in 1/4 second to set new distance record. Radio and cable helped carry two-way conversation around the world.

JAVA 10 P.M. THURSDAY
SHORT WAVE RADIO
AMSTERDAM
LONDON 2:30 P.M. THURSDAY
SUBMARINE CABLE
NORTH POLE
12:30 A.M. FRIDAY
SHORT WAVE RADIO
INTERNATIONAL DATE LINE
FRIDAY
THURSDAY
SHORT WAVE RADIO
NORTH ATLANTIC OCEAN
PACIFIC OCEAN
HAWAII 4 A.M. THURSDAY
SAN FRANCISCO 6:30 A.M. THURSDAY
LOS ANGELES
TELEPHONE LINE
ST. LOUIS 8:30 A.M. THURSDAY
NEW YORK 9:30 A.M. THURSDAY

A TWO-WAY telephone conversation, covering 23,000 miles and reaching completely around the globe, recently set a new distance and time record in the offices of the American Telephone and Telegraph Company in New York.

Over wires, submarine cables and short wave radio, the voice impulses sped, covering this amazing distance in a quarter of a second. The two speakers, president and vice-president of the firm, sat within 50 feet, of each other as they talked over the circuit. Their voices, crossing the international date line far out in the Pacific, went from today into tomorrow and back again into today.

One voice was carried by wire from New York to San Francisco where it was magnified many millions of times and hurled 9,000 miles across the Pacific by short wave radio to Java where it was rebroadcast to Amsterdam. Submarine cables beneath the North Sea completed the circuit to London where it was hurled back at America via radio. The answering voice traveled in the opposite direction.

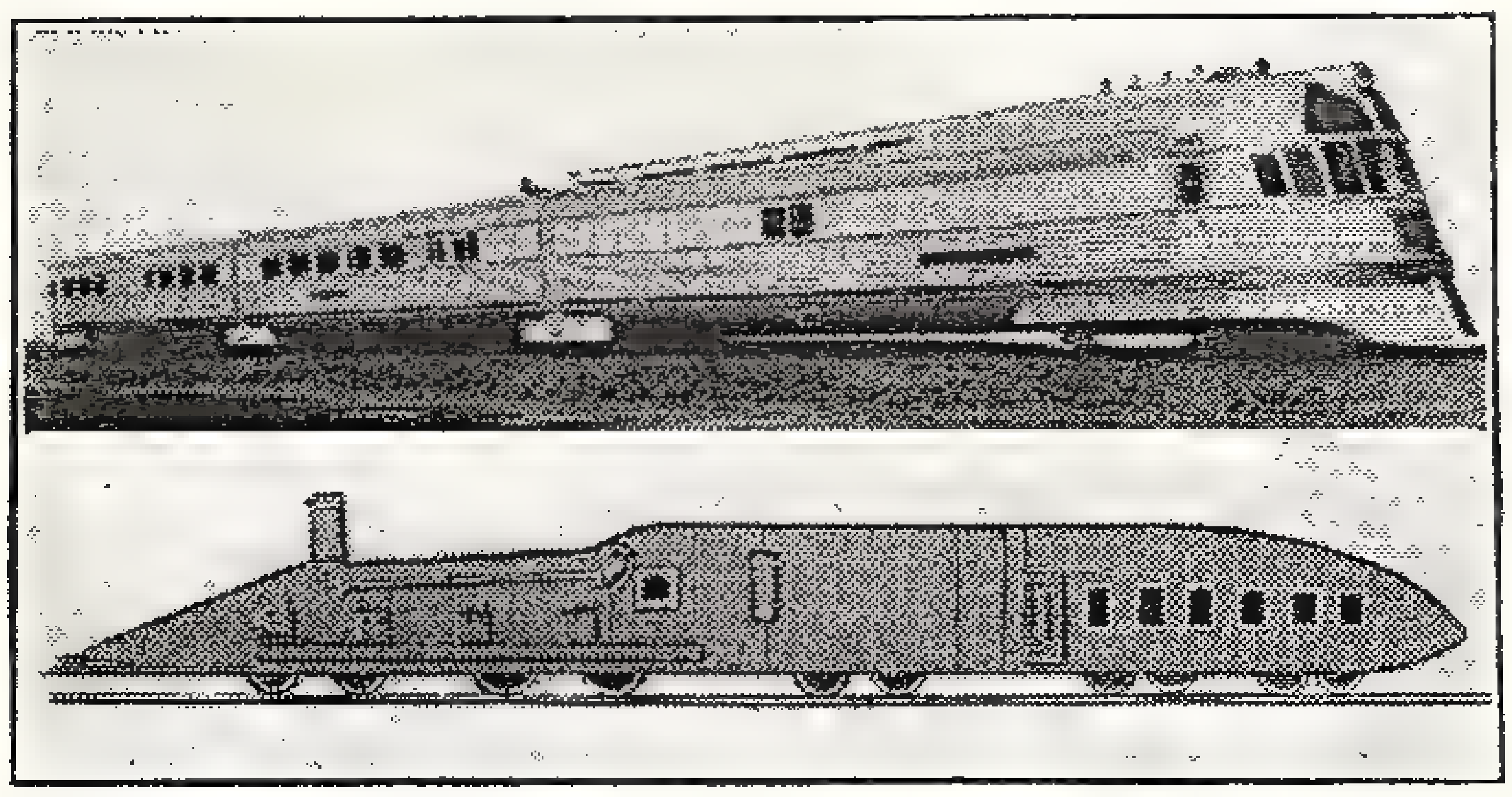
Streamlined Train Patented In 1865

INVENTORS who look too far into the future, pioneering too far in advance of current custom and usage, can hardly expect to profit financially from their patented ideas, according to recent evidence uncovered in the patent office.

The streamlined train, for example, is not new. The first one was patented back in 1865 by Samuel R. Calthrop of Massachusetts. But seventy years ago the railroads were not prepared for streamlining since light-weight, stainless steel and the Diesel engine were not available.

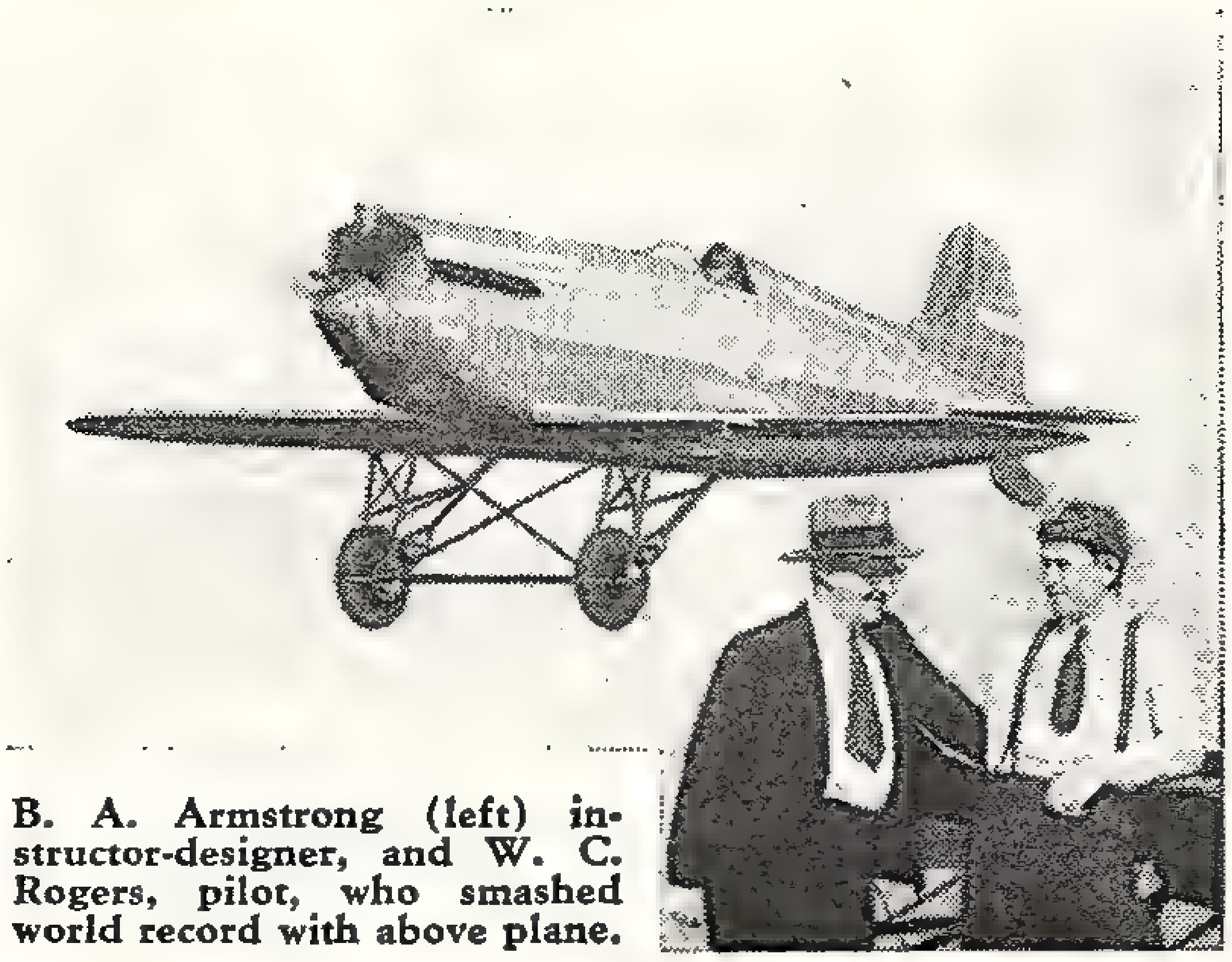
The Inventors Foundation investigation revealed that simple, everyday devices bring more reward than basic inventions.

The airplane, telephone and automobile are said to have given their inventors scant return, whereas the collar button, peg golf tee and metal bottle cap have earned millions.



Top—Streamlined "Zephyr," had a forerunner shown in lower photo, patented in 1865. Because railroads were not ready for streamlining 70 years ago, patent was useless.

Student-Made Plane Hits 325 m.p.h.



B. A. Armstrong (left) instructor-designer, and W. C. Rogers, pilot, who smashed world record with above plane.

A STUDENT-BUILT racing plane, hitting 325 m. p. h., recently surpassed by 11 miles the land speed record held by France. Built by students of a Louisiana trades school, the plane reached 250 m. p. h. on its maiden flight. The high mark was not official.

Ball-Shaped TRAIN Pulled By Magnets

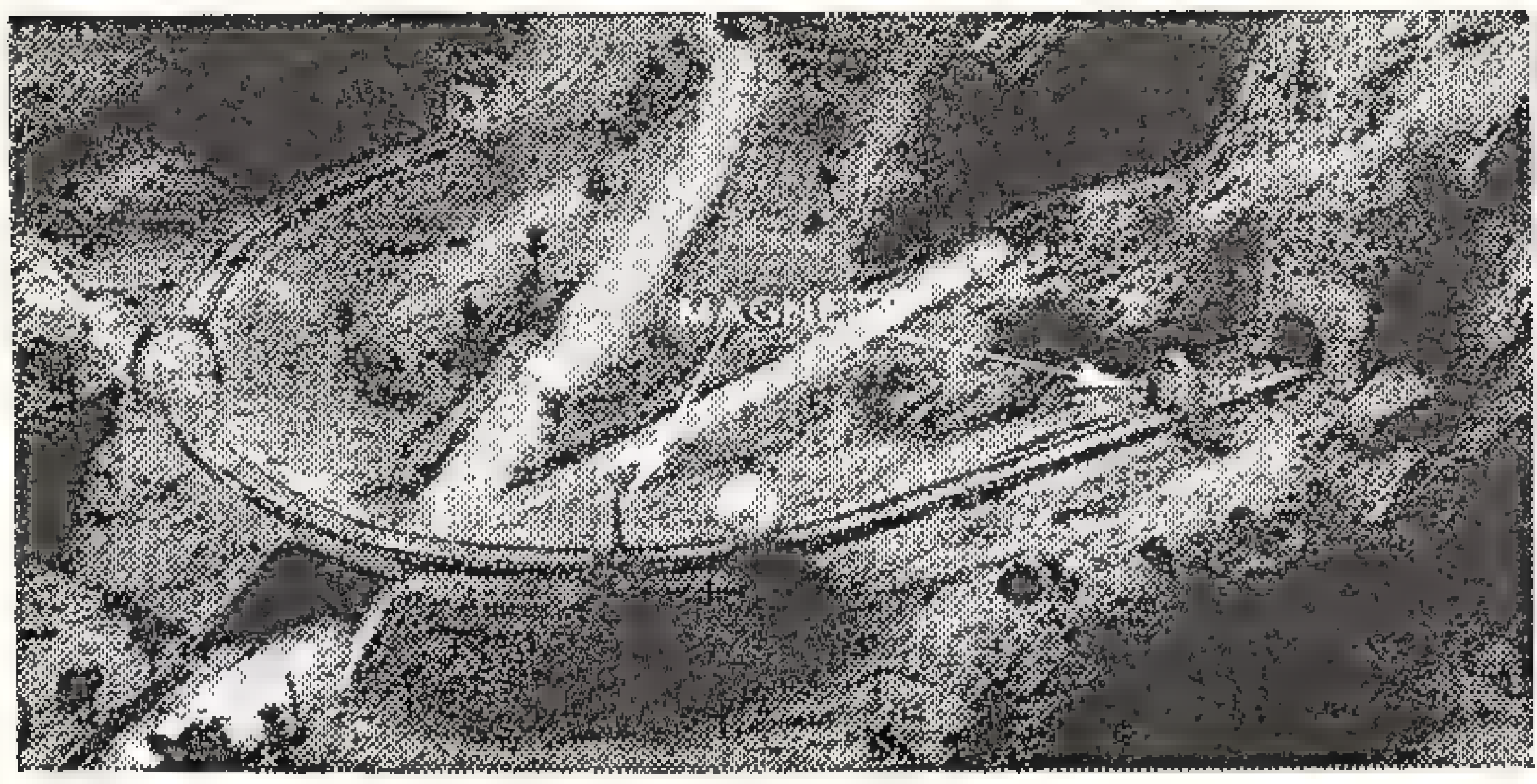


Photo at upper left shows model of ball-shaped train of future zooming over rails. Its speed is expected to reach 300 m.p.h. Magneto arcs provide the locomotion. Above—Metal ball train stops at depot. Inset reveals inner passenger chamber of ball which remains stationary as outer shell rotates. The Swiss "bullet-flash" threatens to revolutionize railroading.

THE "bullet-flash," most radical idea in railroad design since the recent advent of streamlining, has just been conceived by a Swiss engineer. Based on electro-magnetic principles, the new ball-shaped iron horse is expected to roll on standard-size rails at a speed as high as 300 m. p. h.

The outer rotating ball contains a stationary inner chamber for carrying passengers. Giant magneto arcs, located at 300-yard intervals, are expected to provide the pulling power. After passing under an arc, the ball automatically throws a switch shutting off the electro-magnet and is attracted to the next magnet-arc on the rails.

One of the special features of the unconventional "bullet-flash" is that it can be operated over normal rails and roadbeds without radical changes. The one-wheel system is claimed by its inventor to be especially practical for use in mountainous areas.

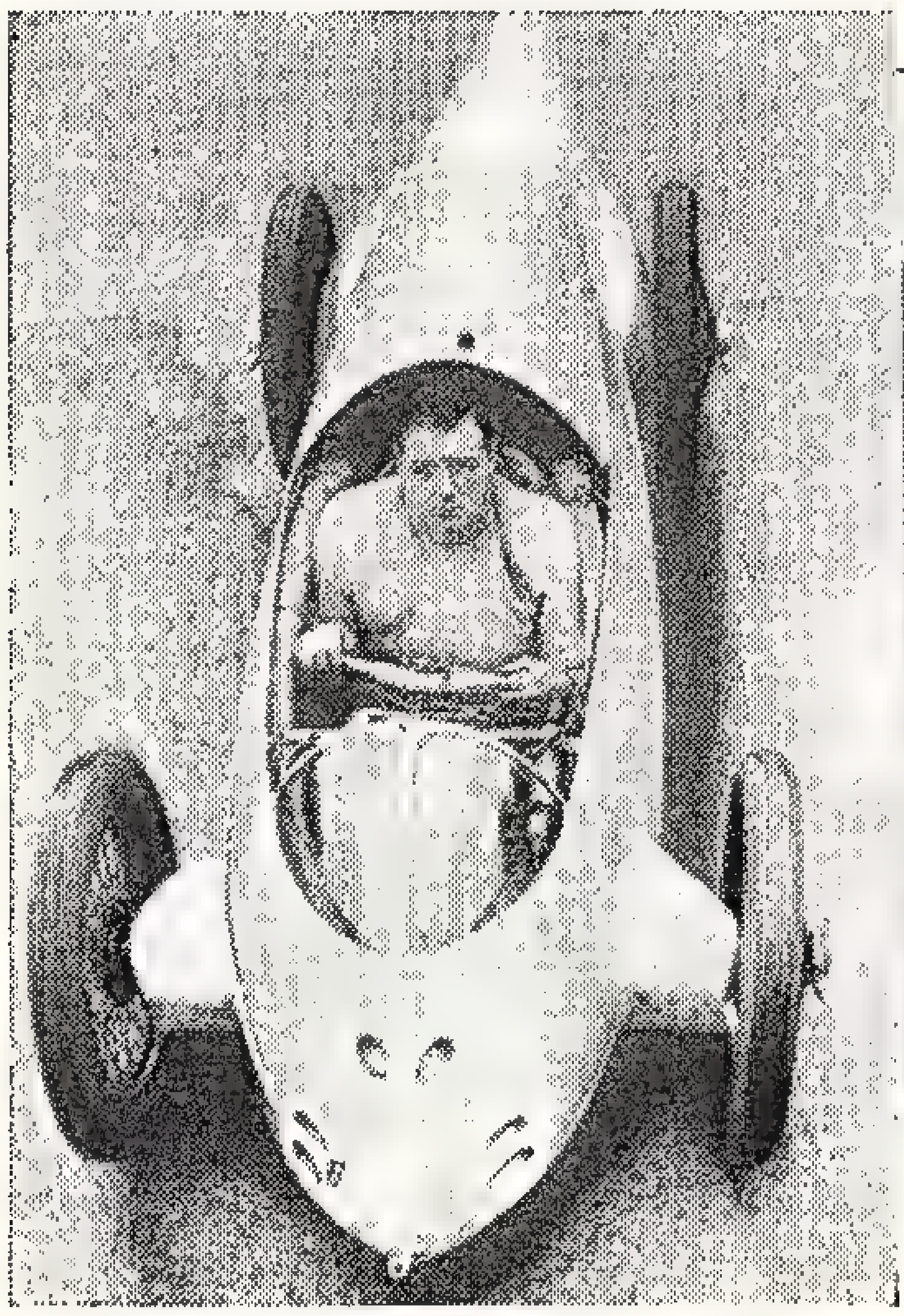
The engineer displayed his model to railroad officials. If further tests are satisfactory, a full-size test train may be built in Switzerland.

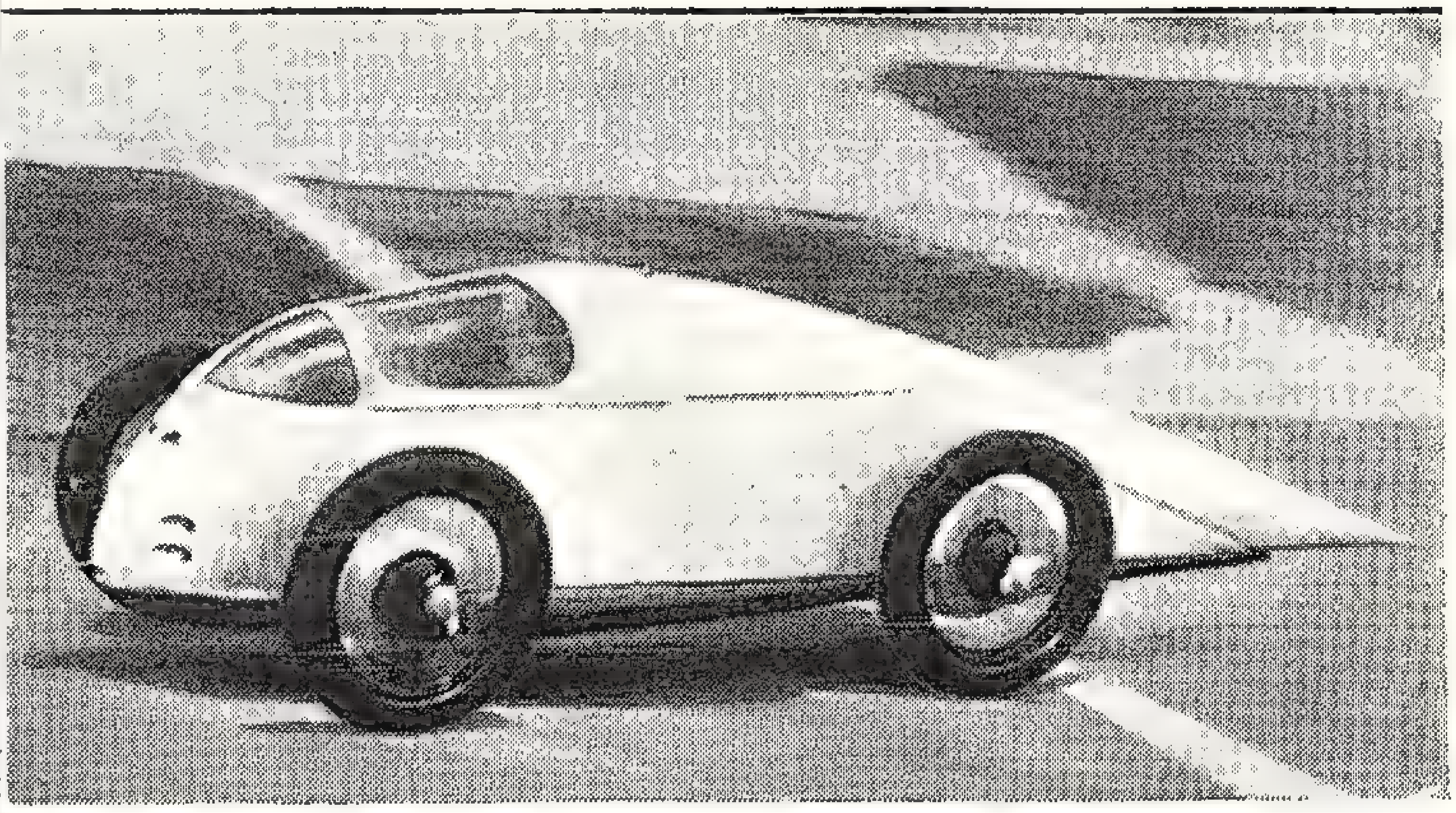
Tear-Drop Auto Has 5 h.p. Motor

RESEMBLING an airplane with wings removed, a new "baby" car undergoing trial in England is expected to make a strong bid for international honors in forthcoming speed runs.

Equipped with a 4½-h. p. motor, the oddly-shaped racer is so small that after the driver is fitted into the seat the cowling is placed over him.

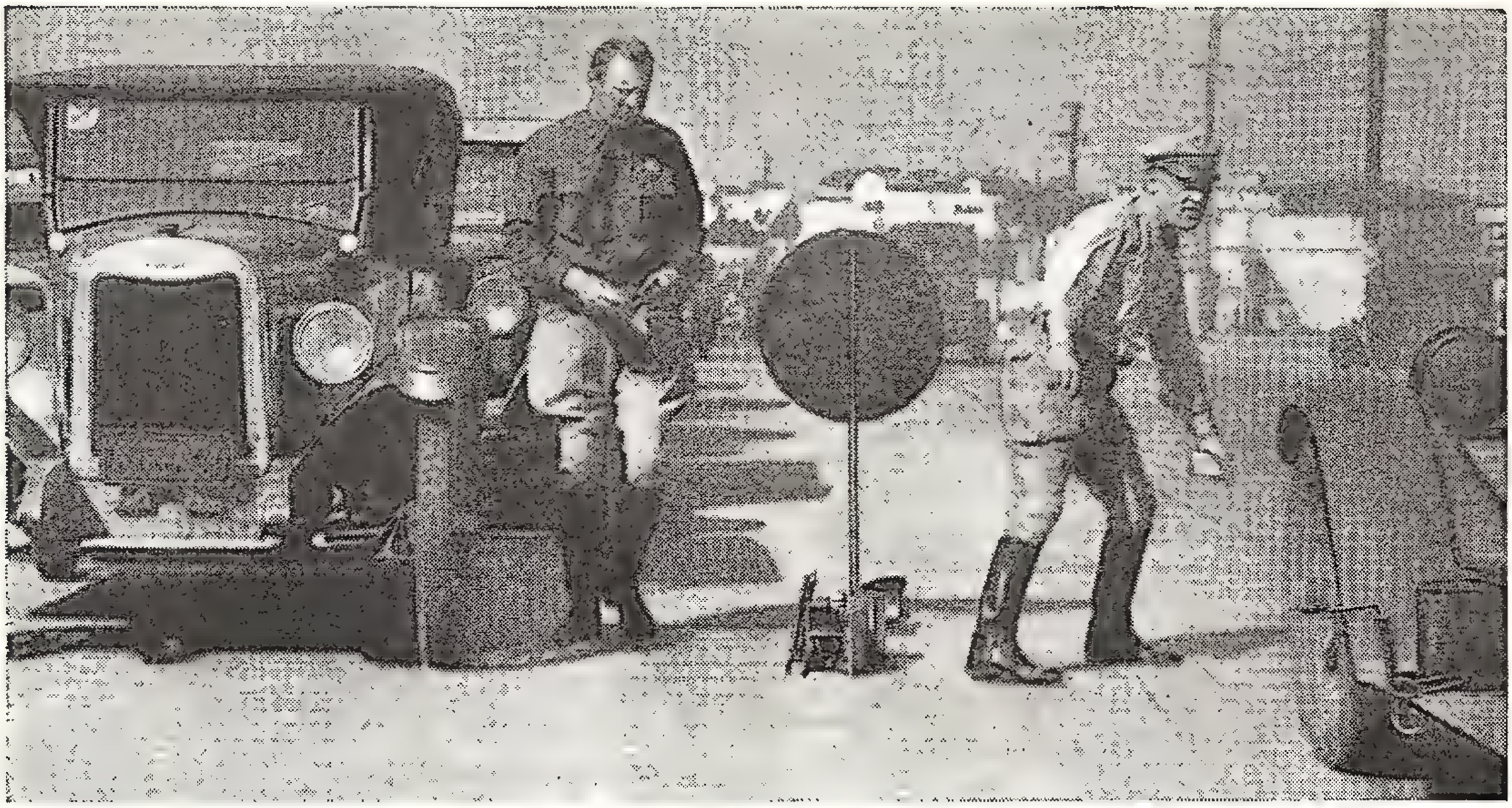
When engaged in racing, the driver is completely encased in his tear-drop car. The engine in the English speeder is located in the rear.





Victor Stafford, famous British racer, is seen at the controls of a new powerful midget car which will attempt to break existing international speed records. The car has its engine behind the driver who must be lowered into his car and the cowling placed over him. The auto resembles an airplane stripped of wings.

POLICE Declare WAR



Seeking killer cars, California Highway Patrol officers stop all autos suspected to be in bad condition, and immediately test brakes. A brake testing box is clamped to the running board, the car is speeded up, and then stopped suddenly at the officer's command. Impact of sudden stop swings pendulum inside box, meter showing stopping distance from 20 m.p.h. speed.

by MAXWELL REID GRANT

WAR has been declared on killer cars!

As an unprecedented wave of auto deaths stains the nation's highways, the chief traffic arteries of the country are being turned into a huge open-road laboratory, where a host of new schemes are being tried out. Police are invoking science to learn what makes accidents and how to prevent them.

The latest developments range from radio "courts of the air" and sensational movies of actual crashes, to resilient highway fences that absorb the impact of careening cars, and sodium-vapor lamps that create artificial daylight for night driving.

Mechanical brains play a large part by "thinking out" the causes of accidents as revealed by statistics. Their findings have debunked many pet theories, have set up these startling new facts:

Mist and rain do not increase, but actually reduce hazard. Fewest accidents occur in the worst weather; drivers instinctively fear skidding and drive with more care on wet pavement.

Fast driving in city traffic does not save time. A car going thirty miles an hour across town gets there just as soon as one going forty-five or fifty. Your car's brakes must be—and are three or four times as powerful as its engine.

Chief Davis of the Los Angeles Police Department says that the automobile is one of the modern world's worst killers.

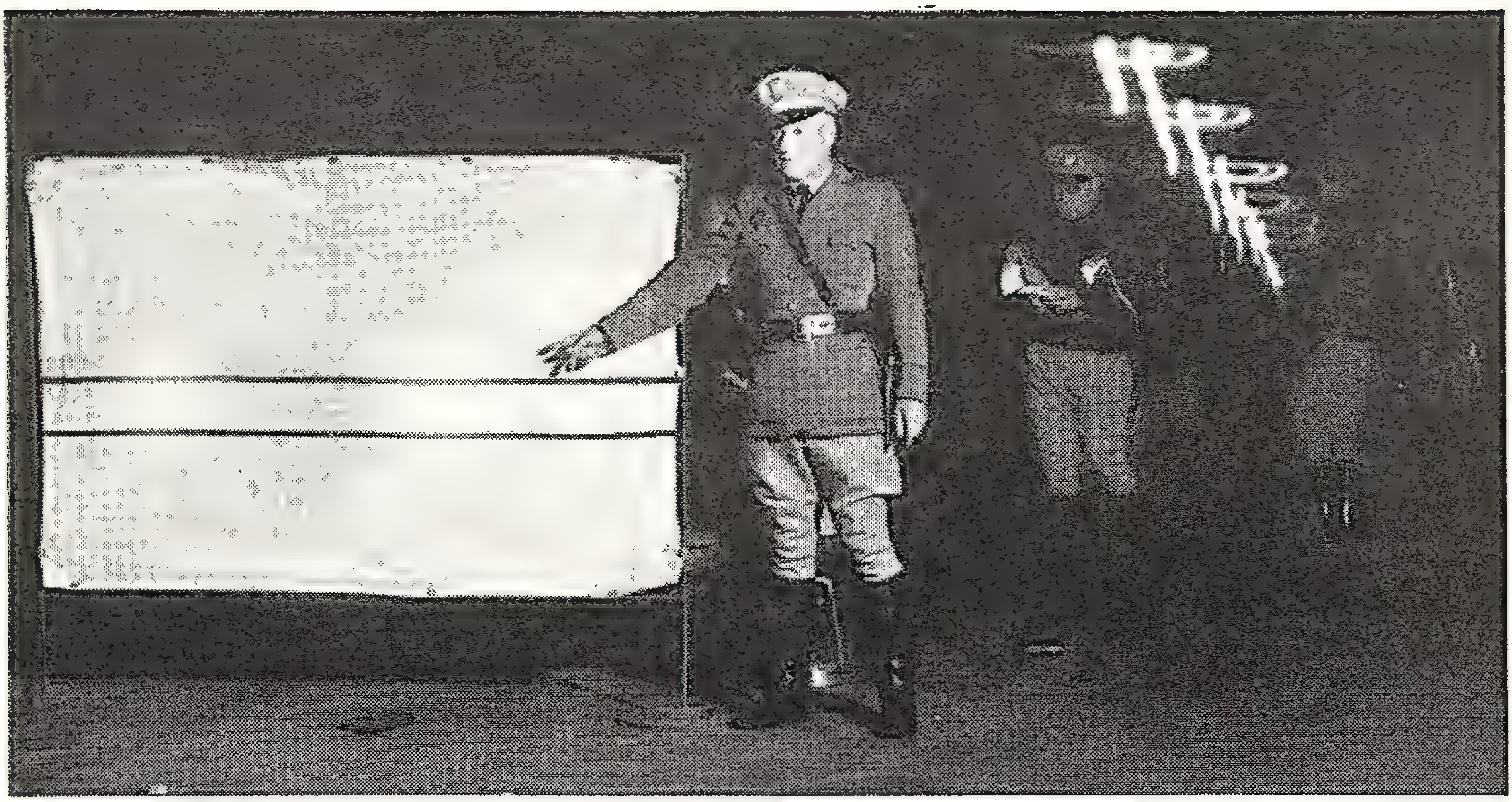
"Auto deaths," he states, "now outnumber homicides three-to-one; suicides, two-to-one. Each year we actually spend a half billion dollars more for accidents than for new cars. Economic loss through auto crashes is four times the national fire loss. Statistics show that more than half—perhaps 90%—of these accidents are caused by a small group of irre-

DEATH TOLL OF 1934 KILLER CARS

HOW DEATH CAME:	No. Killed
Pedestrians hit	15,950
Stationary object collisions	8,850
Collisions between autos	8,570
Collisions with other vehicles	2,630
1934 Killer Car Death Toll	36,000
Collisions involving personal injury	882,000
Persons injured—nearly	1,000,000

AUTO DRIVERS KILLED 22,100 BY:	
Exceeding speed limit	6,850
Being on wrong side of road	3,470
Contesting right of way	2,740
Driving off road	3,820
Driving recklessly	2,740
Passing cars and cutting in	1,180
Miscellaneous causes	1,300
Fatal Accidents Due to Drivers	22,100

On KILLER CARS!



Captain Stevens of the California Highway Patrol points out a headlight test chart used in war on killer cars. Autos are stopped a definite distance ahead of chart; those whose headlight beams go above upper black line get tickets. More than 1,000 cars ordinarily pass through such a test trap in one shift. Unless defects in lights are corrected at once, fines are imposed.

sponsible drivers numbering only 7% of the population.

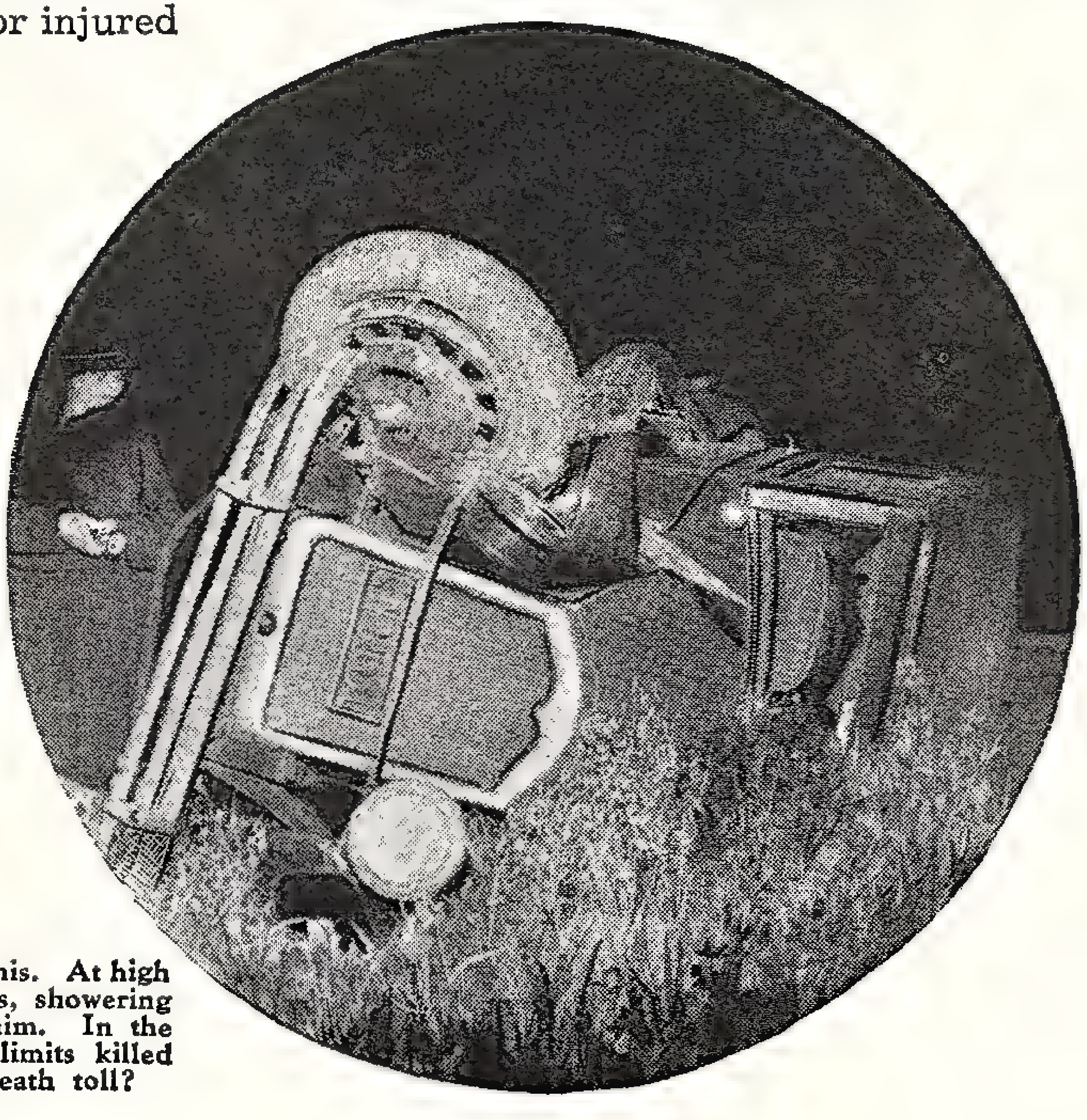
The odds this year are 1 to 100 that you will be involved in an auto accident. Your chances of being killed in an accident are 1 in 3,500. This means that, within the next five years, some one of a group of twenty of your close friends will be killed or injured in a motor vehicle accident.

To save the 40,000 lives which in 1935 will be needlessly sacrificed if the rising trend of auto deaths continues, traffic authorities throughout the country are declaring war on killer cars and killer drivers.

To test the results of "unrestricted speed," motorists on a wide California boulevard were allowed to "step on it" to their hearts' content. In just two days, speeds became so excessive that it was almost impossible for a pedestrian to cross. Accidents, injuries, and deaths piled up overnight and the experiment had to be stopped before it was fairly started.

A sharp increase in traffic deaths on the busy Bay Shore Highway near San Francisco, prompted another drastic experiment. Night and day, motorcycle officers patrolled this boulevard, under orders from Highway Patrol Chief E. Raymond Cato to stop all

[*Continued on page* 125]



Killer cars and killer drivers make accidents like this. At high speeds, autos bounce and roll like rubber balls, showering splinters of glass and metal which kill and maim. In the United States alone, drivers exceeding speed limits killed 6,850 in 1934. What will be the 1935 death toll?

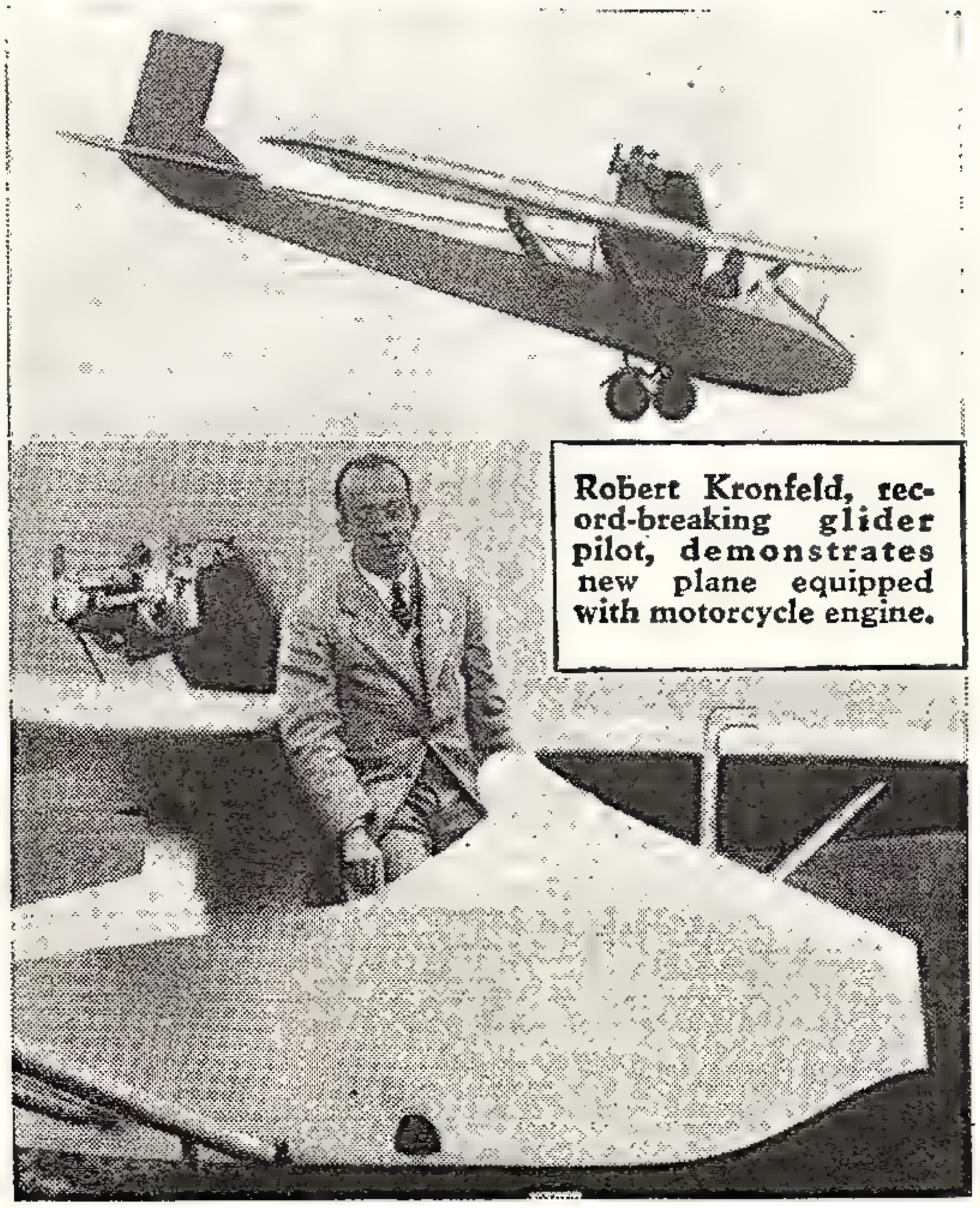
Modern Pioneers Invade Last Frontier to Build New Colony

Above — Typical group of transient camp workers prepare to leave for Alaska to start Uncle Sam's rehabilitation project in the Matanuska Valley. Each family gets 40 acres and a loan of $3,000. Left—One of party leaders fits colonist with head netting to be used in fighting mosquito plagues.

THERE'S a new rush on in Alaska these days, but the attraction is not gold. Modern pioneers, jobless, depression-hurt, are Alaska-bound with their wives and children to start life anew in the fertile valley of Matanuska. Here in an area of 200 square miles the government has set aside 40-acre family tracts where, under proper supervision, married newcomers will break fresh ground for farms, log cabins, stores, schools and churches. Sixty teams of horses, 150 cows, 5,000 chickens, five well drills, two snow plows and several tractors will be taken to the new community. The site of the village is near Anchorage.

Smallest Plane Is Easy to Fly

WHAT is believed to be the tiniest plane in existence was recently demonstrated in England. The 5-h.p. single-seater, equipped with a motorcycle engine, is said to reach a speed of 50 m. p. h. The inventor claims that even an inexperienced person can learn to fly the plane in one day.



Robert Kronfeld, record-breaking glider pilot, demonstrates new plane equipped with motorcycle engine.

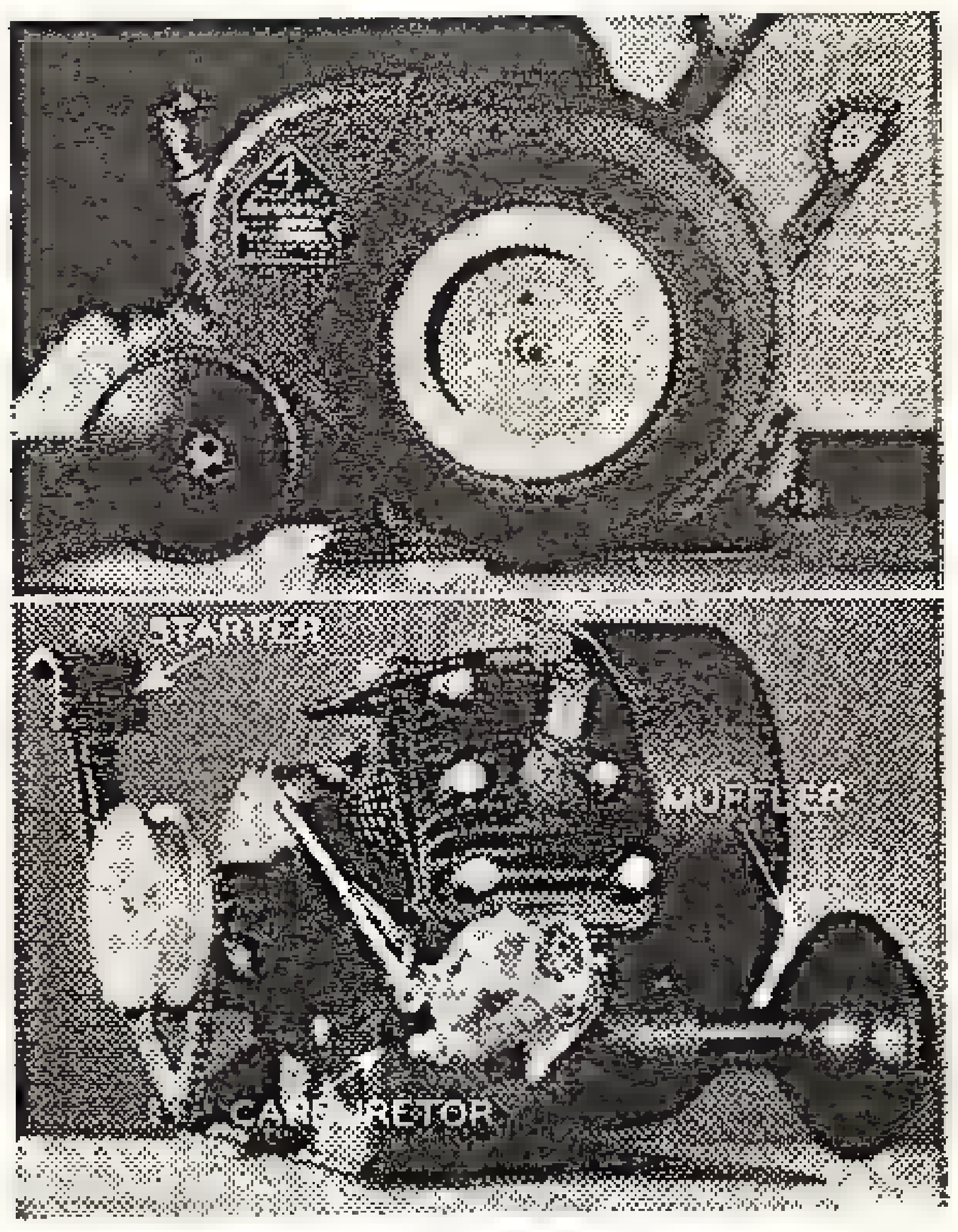
Generator Converted Into Drill

Operating drill made with Ford generator and set of parts.

COMPLETE sets of parts are now available for converting an ordinary Model T Ford generator into a heavy duty electric drill. Special gearing reduces the motor speed to 370 r.p.m., providing sufficient power to handle ⅝-inch drills. The motor operates on 32 or 110-volt A. C. or D. C.

Midget Gas Motor Is Compact

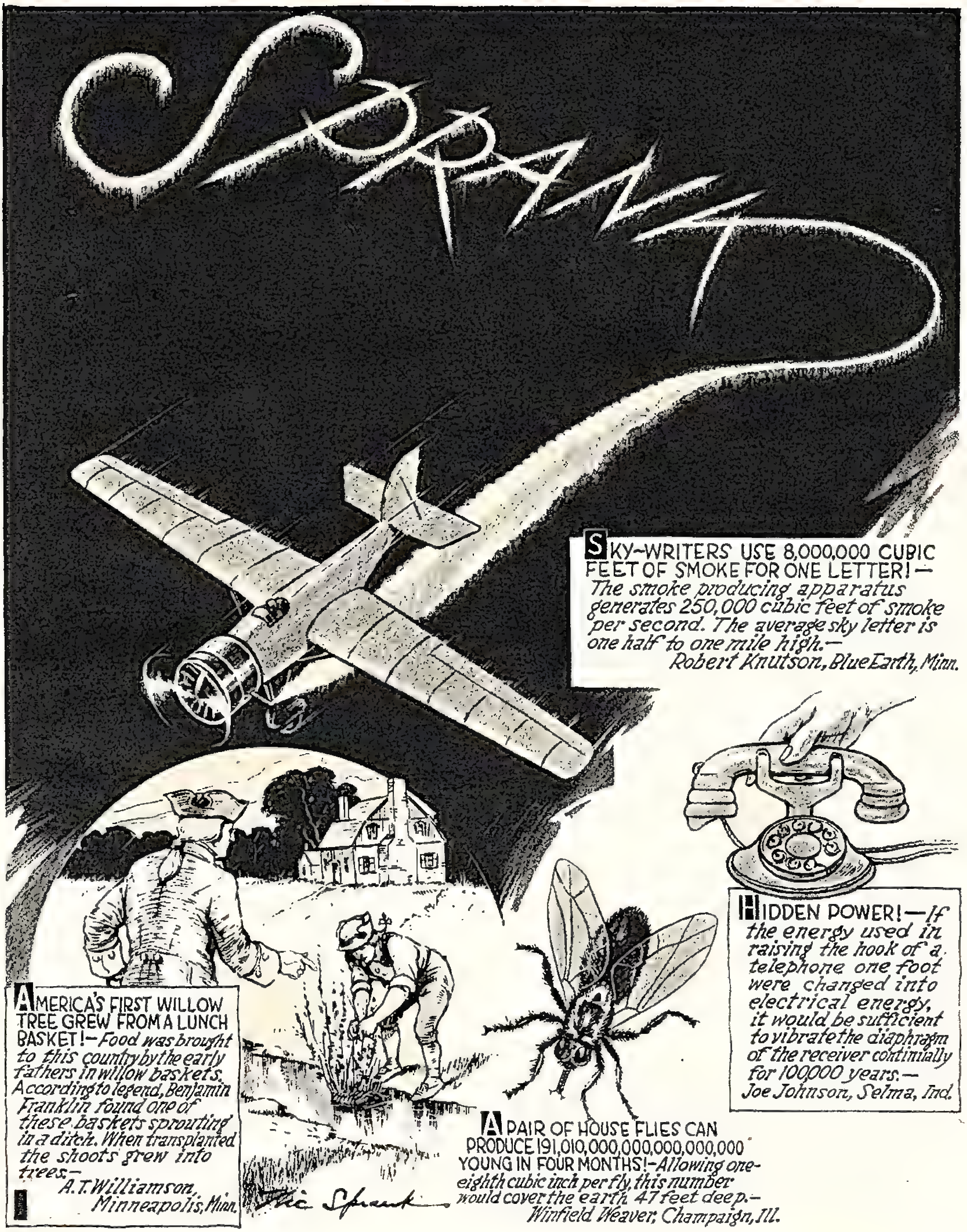
A NEW ⅝-h.p. air-cooled, gasoline engine, light weight and compact, has been put on the market for use in operating washing machines. Midget car builders also might adapt the tiny four-cycle motor for propelling their racers.



Two views of midget motor for use in operating wash-machines.

Sky Letter Uses 8,000,000 cu. ft of Smoke

Nic Sprank in ODDITIES of Science



SKY-WRITERS USE 8,000,000 CUBIC FEET OF SMOKE FOR ONE LETTER!—*The smoke producing apparatus generates 250,000 cubic feet of smoke per second. The average sky letter is one half to one mile high.*—
Robert Knutson, Blue Earth, Minn.

HIDDEN POWER!—*If the energy used in raising the hook of a telephone one foot were changed into electrical energy, it would be sufficient to vibrate the diaphragm of the receiver continually for 100,000 years.*—
Joe Johnson, Selma, Ind.

AMERICA'S FIRST WILLOW TREE GREW FROM A LUNCH BASKET!—*Food was brought to this country by the early fathers in willow baskets. According to legend, Benjamin Franklin found one of these baskets sprouting in a ditch. When transplanted the shoots grew into trees.*—
A. T. Williamson, Minneapolis, Minn.

A PAIR OF HOUSE FLIES CAN PRODUCE 191,010,000,000,000,000,000 YOUNG IN FOUR MONTHS!—*Allowing one-eighth cubic inch per fly, this number would cover the earth 47 feet deep.*—
Winfield Weaver, Champaign, Ill.

Win $1! Send your Oddity of Science to Nic Sprank, Modern Mechanix & Inventions Magazine, 529 South 7th Street, Minneapolis. None accepted unless source or proof is given. Do not include oddities with other manuscripts or letters.

Grappling With Death UNDER THE SEA

C. H. Purcell, chief engineer of the San Francisco-Oakland Bay Bridge, wishes Bill Reed a safe dive as he descends the ladder of the "Active" into the sea to examine the foundations of the bridge project. Diver Reed used bare hands and a metal rod to examine the concrete.

IT IS a far cry from the old diving days of manually operated air-pump and the jerked-cord signals to the modern air compressor and the portable telephone used by divers of today, but the romance and danger of diving remain.

I have been engaged in deep sea diving for the past 28 years and during that time I have had some mighty close calls with death.

You get so you accept what happens below surface as a matter of course, but I had my worst experience when, while working at a depth of 150 feet, my air line parted. It was on the Southern Pacific Bridge job. I had been down for some time inspecting a caisson when I realized that my air flow had ceased. By shutting the emergency valve instantly I knew I could conserve what air was in the dress. That would last only a period of seconds before turning to carbon dioxide, a gas that will not sustain life.

It takes time to bring a man up from the depth working with utmost haste. The crew above knew what had happened and they were doing their best. It was a harrowing two minutes before I saw the light at the top. I didn't feel any ill effects till the next morning. When I awakened, I realized the sight of one eye was gone. The doctor said the extreme pressure had severed the nerve. Perhaps that helps to account for the fact that compensation insurance rated on divers is the highest in the world.

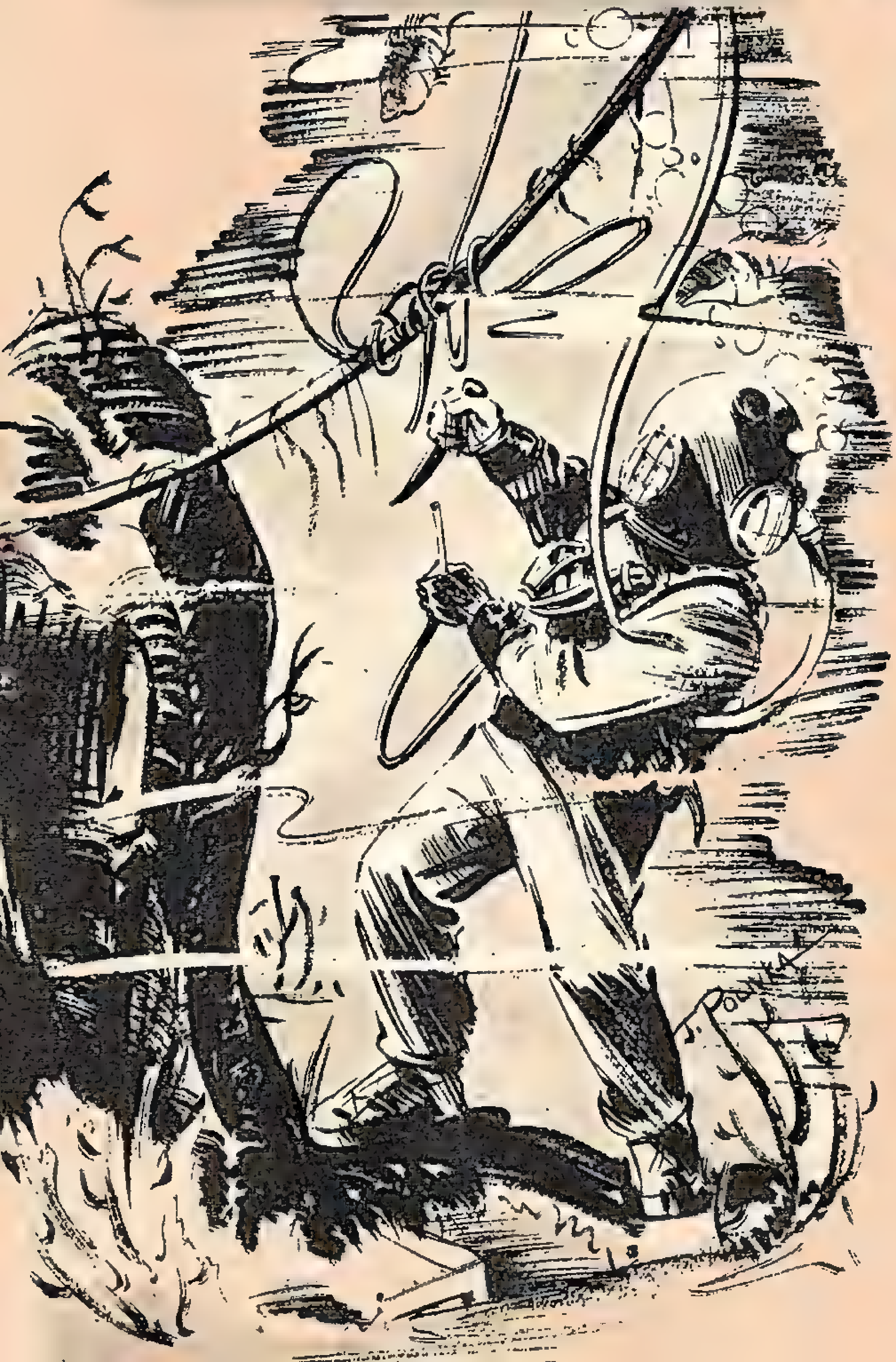
People ask me about thrills, adventures, narrow escapes, and all that. Well, after you've been doing something 28 years, it's really much of a routine thing. People seem to think that the life of a deep water diver is just a series of battles with man-eating sharks and devil fish, or searches through old wrecks for sunken gold. It isn't much like that.

It is mostly grubbing around in the mud at the bottoms of rivers and harbors, inspecting *by* **WILLIAM REED**

Holder of World's Record
Undersea Dive,
as told to Charles W. Geiger

"The swirling tide made a plaything of my safety rope. It entangled. When I was ready to ascend to the surface, I was caught. Making a quick decision, I cut the safety rope. Only the rubber hose supplying me with air was left by which to pull me to the surface. A weak spot in the hose, a jerk of the tide, a split in the rubber, and the water would have filled my diving suit." This is just one of the thrilling episodes in this story of adventure beneath the sea.

Here is William Reed, the champion diver, who tells of his harrowing experiences beneath the sea in the accompanying story. The composition helmet shown contains earphones. The metal head piece is fastened to the collar of the suit. Note the heavy safety rope which Reed had to cut when it entangled.



pier foundations, fishing for broken cables, seeing if old hulls are worth raising.

One moment there is the queer figure of a diver on his ladder with his steel shod shoes and his helmet and breastplate of steel. The next there is just a hissing and gurgling of air and a trail of bubbles from the sea depths to mark where the human being is laboring in mud and slime of the ocean floor. But romance and danger of diving remain. Many people ask me what I think about when I'm being lowered into the depths of the water. Of course, the only thing I think about is the job I'm going to do when I get down to the bottom. No, the thought of danger never enters my mind. I'm just as apt to get hurt crossing Market street in San Francisco (and probably more apt to) than when I am walking along the floor of San Francisco Bay.

The main idea in diving is to see that your apparatus is in apple-pie order, then to go down quick, keep your head while you are down, and come up slow after you have

BILL REED WENT DOWN 246 FEET IN RECORD DIVE

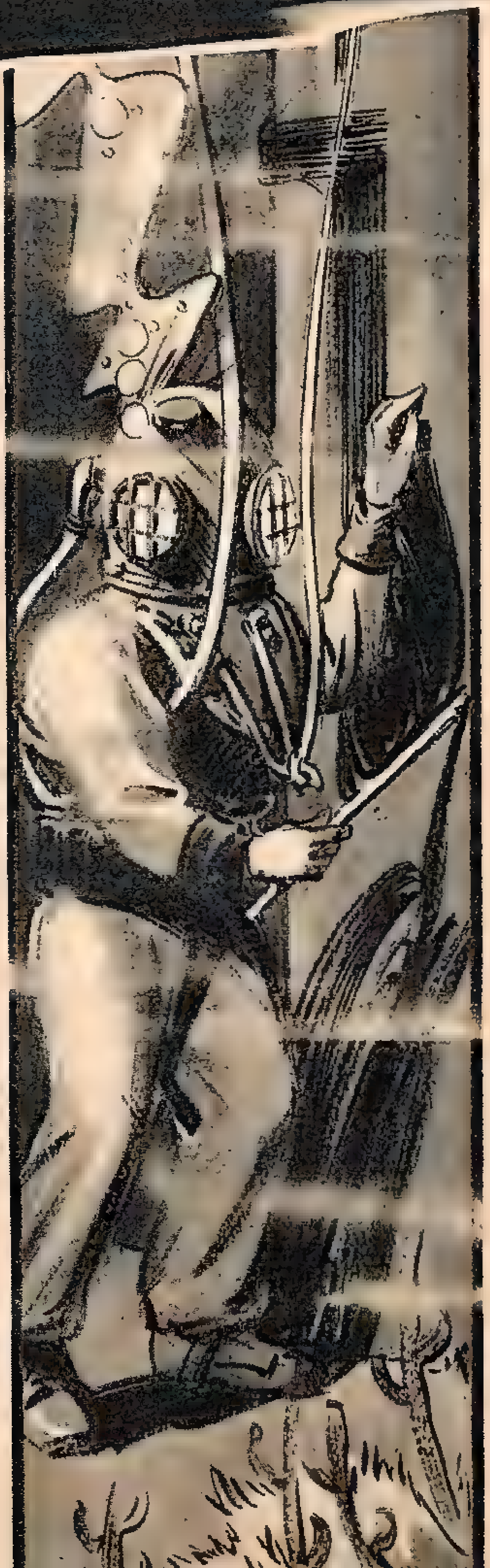
In this decompression chamber the diver gradually becomes accustomed to air pressure on the surface after making a dive to avoid the "bends." Air compressor is in foreground with air purifier at left. In background is steam room and massage department of Reed's boat "Active".

finished what you went down to do.

When you are working deep down on the bottom of the bay, tons of water are pressing in on you. As you rise, the pressure slacks off, and if it decreases too rapidly your body can't adjust itself to the change and a nitrogen bubble is apt to form in the blood stream. That means awful agony, and sometimes death.

So, I am never in any hurry about coming to the surface, or in leaving the decompression chamber after reaching the surface. In the chamber you are under artificial air pressure, that is lightened gradually, for hours.

Of course, in 28 years of diving, you have lots of things happen to you out of the ordinary—what people call thrills, only you are generally too busy at the time to think of them as anything else than a job that has to be done.



I will never forget the hours I spent hanging under water against the side of the old hospital ship "Graf Waldersie" during the war. She was rammed by a freighter about 125 miles off the New Jersey Coast when she was returning to America with 2000 wounded American soldiers. They couldn't transfer the wounded men to another ship, and they couldn't tow her in—the water was gaining on her pumps too fast.

We got the SOS and the message that a diver might be able to help. I flew out with my diving outfit and went down the side of the ship. There was a wicked big hole below the water line with the ocean pouring in plenty fast. I never worked so hard in my life rigging a temporary patch and trying to hold it in place to stop some of that water and give the pumps a chance to keep the vessel and those wounded boys afloat. We finally got her past Sandy

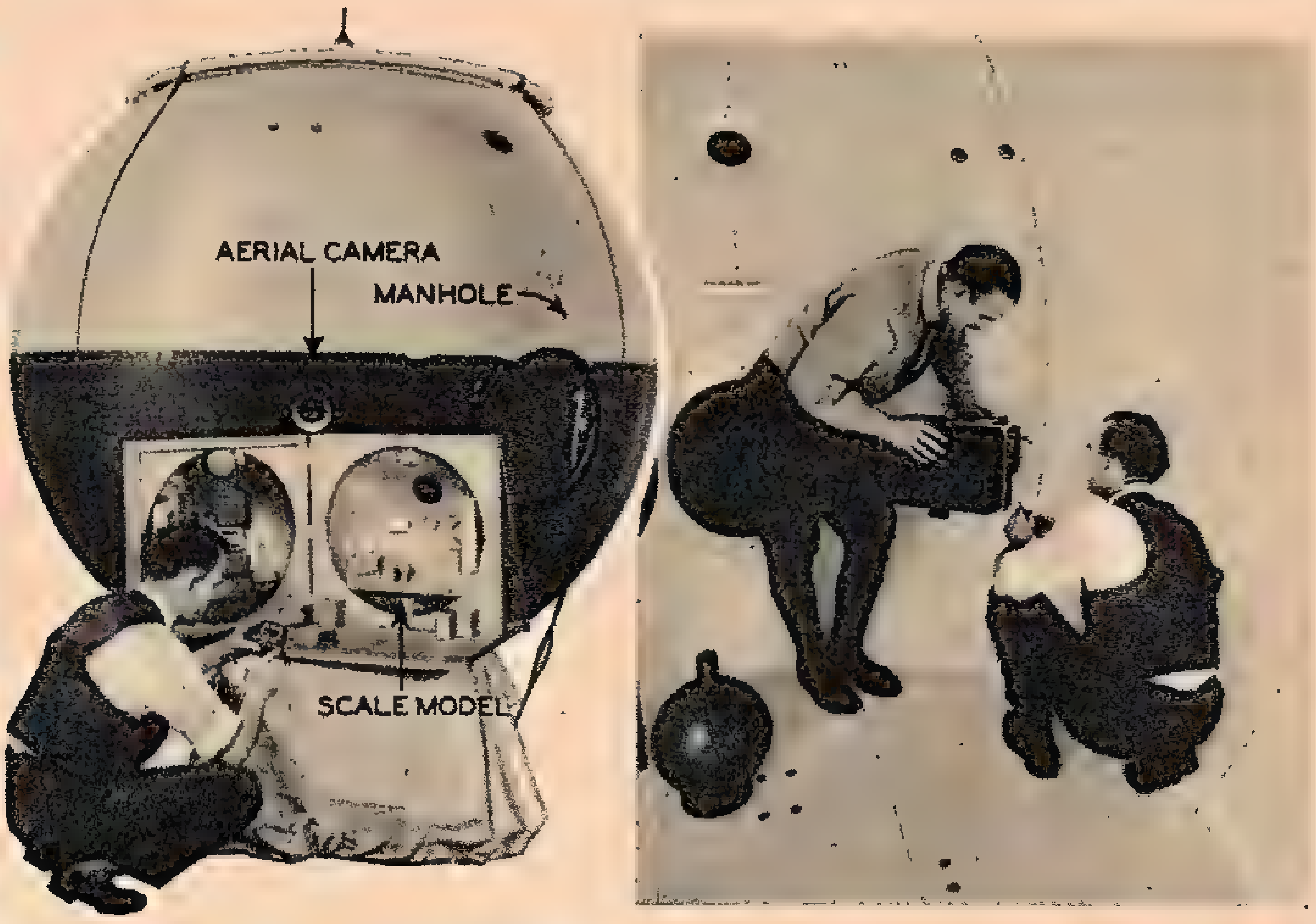
[*Continued on page* 127]

Largest Gondola to Carry 6-Ton Cargo Into Stratosphere

THE largest gondola ever constructed for stratosphere exploration will take to the air to delve once more into the ceiling of the world.

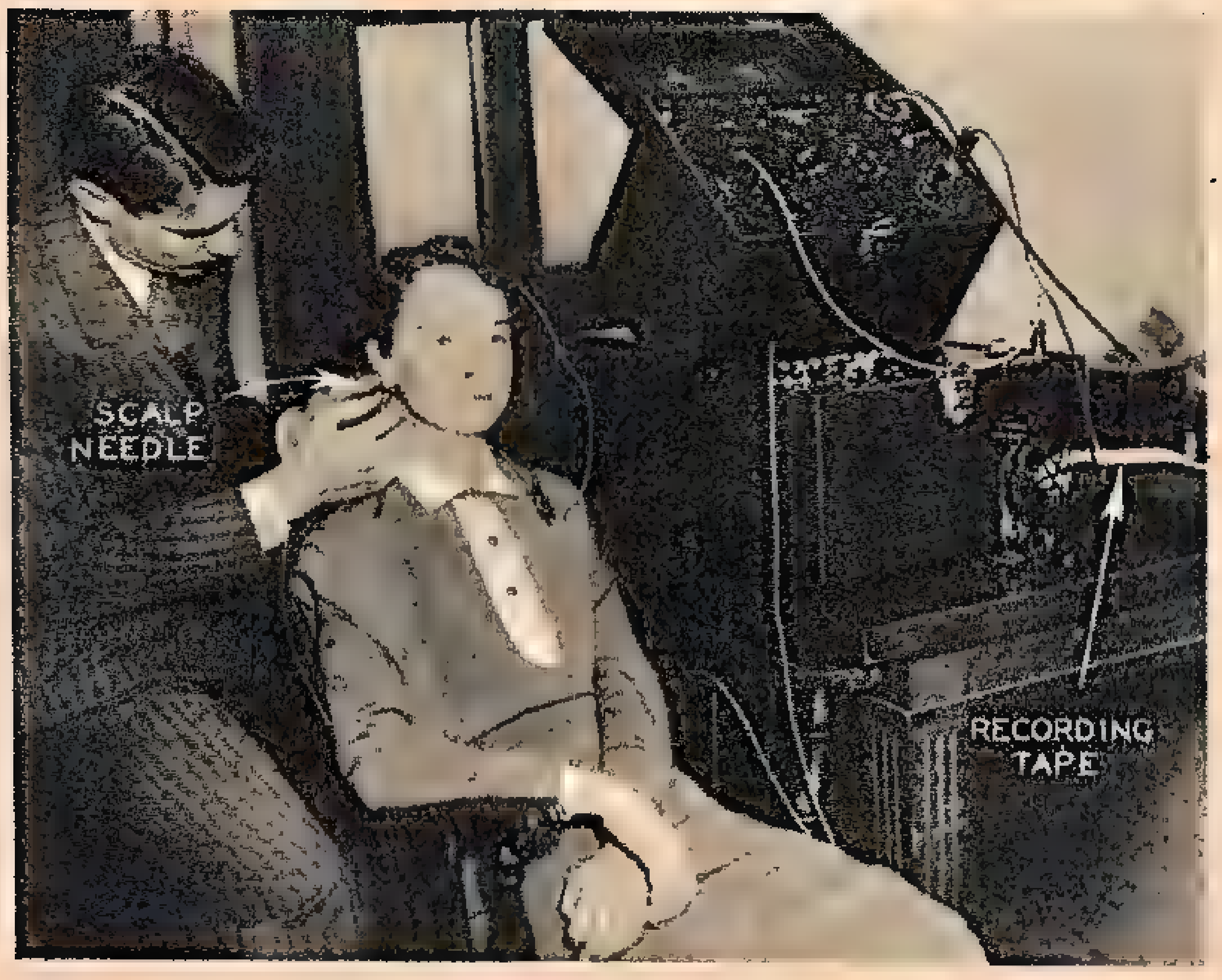
Nine feet in diameter, weighing 638 pounds, the metal ball will house more than a ton and a half of costly instruments. In addition, Captain Albert W. Stevens and his aides will carry aloft four tons of ballast. To determine the space-saving location of the pieces of cargo, a scale model is being used.

The big ball will carry an aerial camera mounted in the wall to photograph the curvature of the earth. A 5-inch port hole will permit sky studies. A radio antenna, projecting through two outlets near the top of the gondola, will enable the flyers to broadcast observations.



Scale model, shown in front of 9-foot gondola, determines location of instruments. Right—Capt. Albert W. Stevens mounts aerial camera inside gondola.

Brain Tester Records Thoughts



Needles placed in scalp and ear of subject send amplified signals to recording tape. Here wave patterns show electrical changes which take place during rest and activity.

ELECTRICAL changes which occur within the human brain during periods of rest and activity are recorded by means of a scientifically marvellous instrument recently developed at the Harvard Medical school.

Needles placed in the subject's scalp and ear transmit the brain reactions to vacuum tube amplifiers and thence to a recording tape where the wave pattern is written. Patterns made while sleeping or fainting differ from "waking" patterns.

Dwarf Radio Tubes Made of Metal

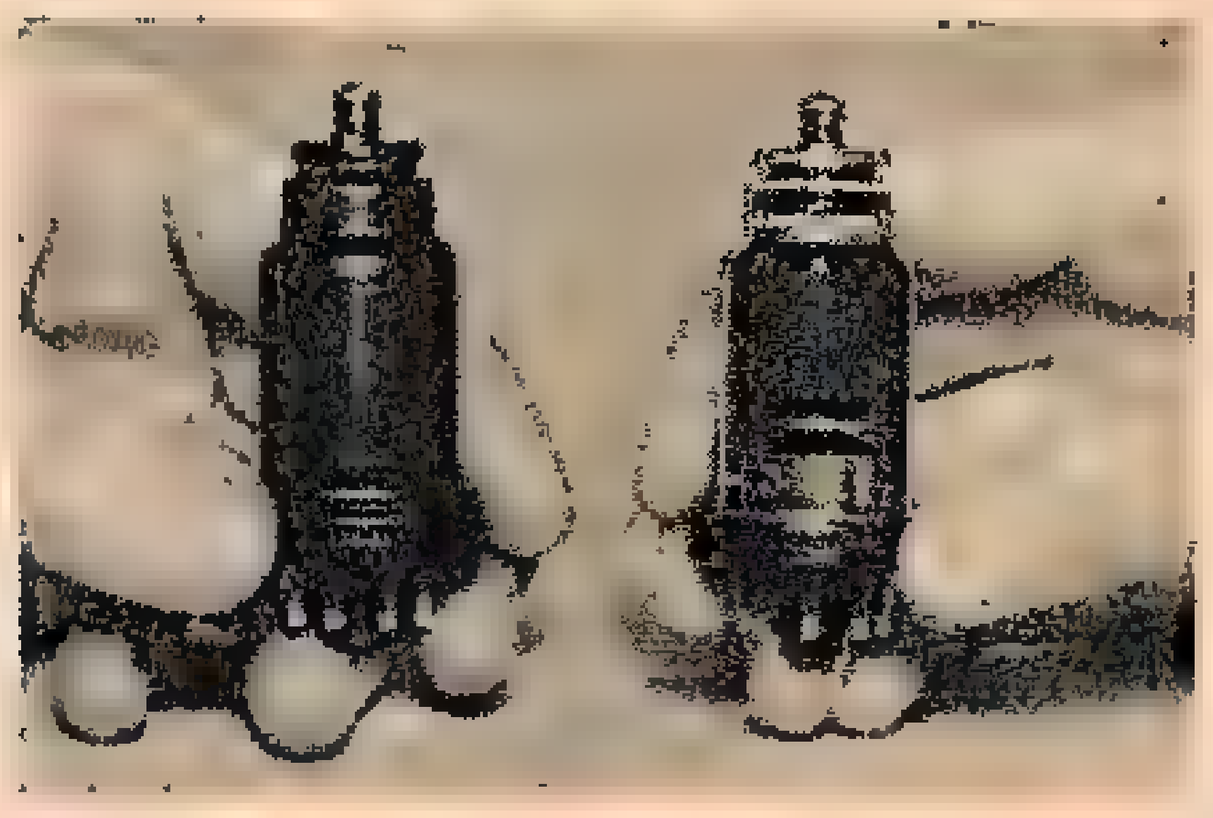
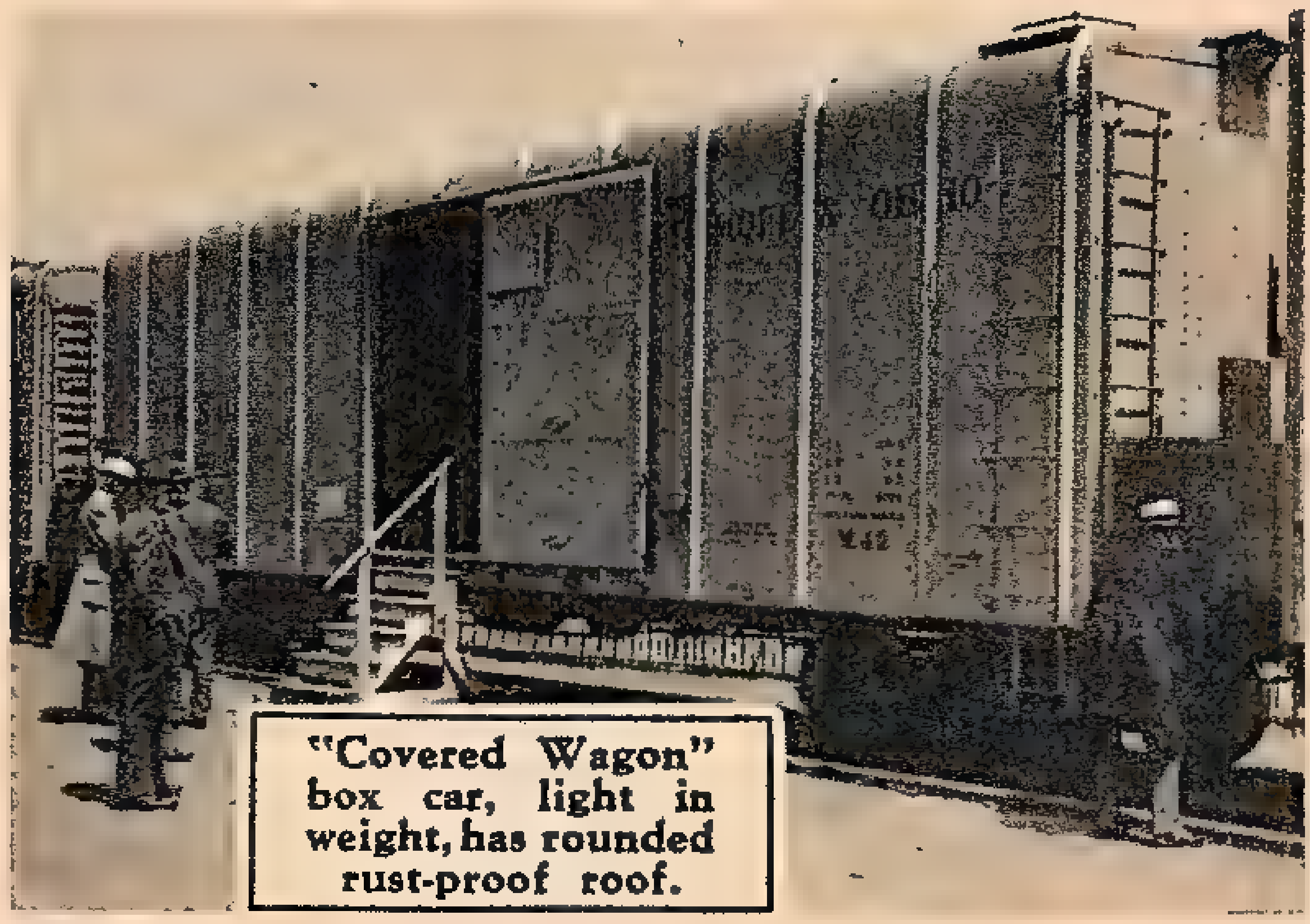


Photo shows exterior and cutaway view of new metal amplifier tube.

GREATER efficiency, longer life and better reception are claimed for the new unbreakable metal radio tubes recently introduced. Half the size of glass tubes, the metal tubes are said to aid short-wave reception.

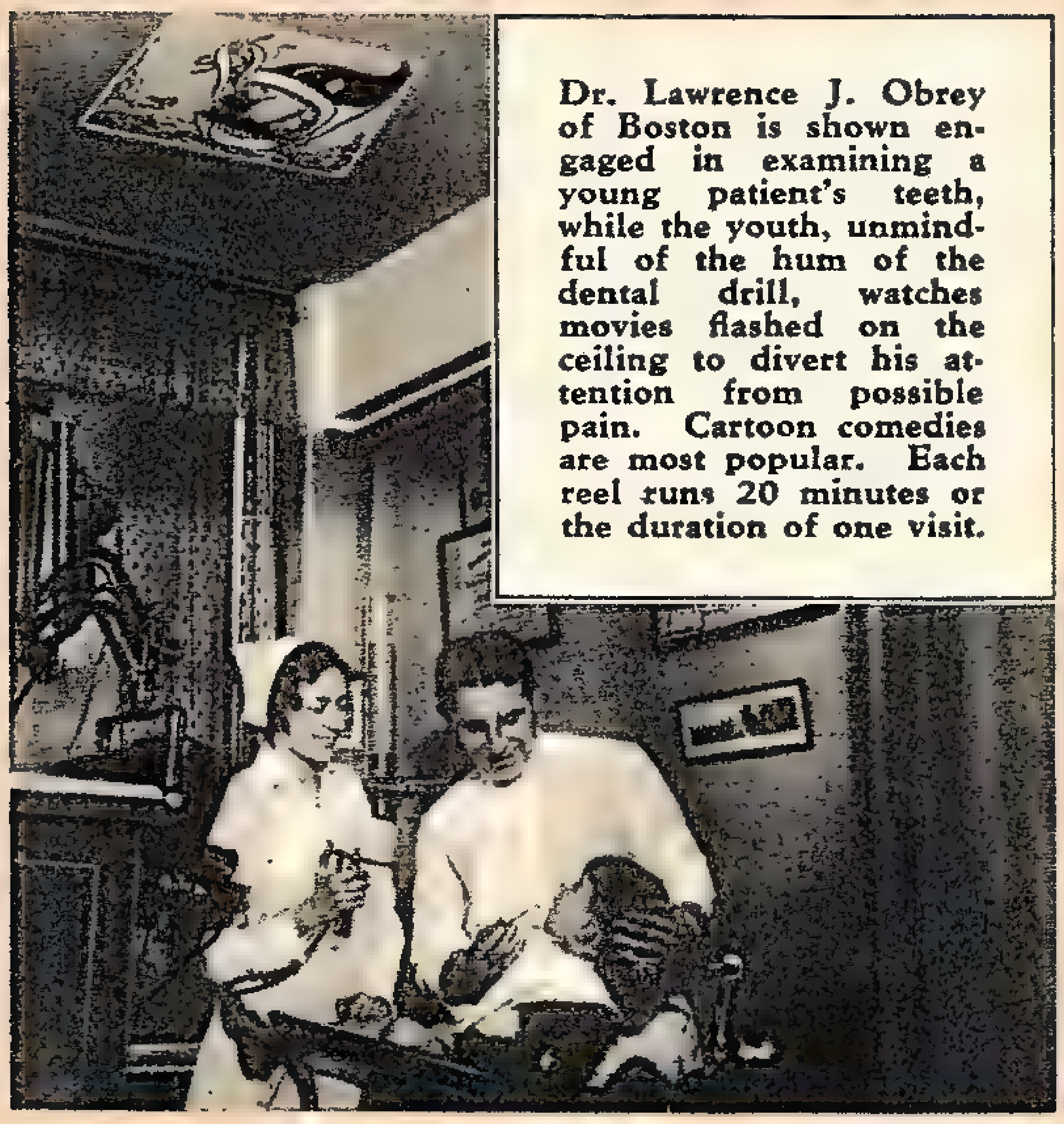
"Covered Wagon" Box Car Designed

EVEN the new light-weight freight cars have succumbed to the streamlined vogue. Resembling covered wagons, the "boxes" have rounded roofs, shock absorbers and are built of rust-proof metals.



"Covered Wagon" box car, light in weight, has rounded rust-proof roof.

Ceiling Movies ROUT Fears of Patient



Dr. Lawrence J. Obrey of Boston is shown engaged in examining a young patient's teeth, while the youth, unmindful of the hum of the dental drill, watches movies flashed on the ceiling to divert his attention from possible pain. Cartoon comedies are most popular. Each reel runs 20 minutes or the duration of one visit.

A BOSTON dentist has discovered a new sort of "anesthetic," in the form of motion pictures, which he claims is so effective that patients refuse to leave the chair at the conclusion of their dental work. One peculiar effect of the new "drug" is that it soothes harsh feelings against dentists. Patients no longer fear the semi-annual visit.

The movies, projected on the office ceiling, divert the patients' attention as the doctor fixes their teeth.

Mickey Mouse and Popeye the Sailor pictures are most popular with the younger patients, according to the doctor.

Garbage Used In Building Tile

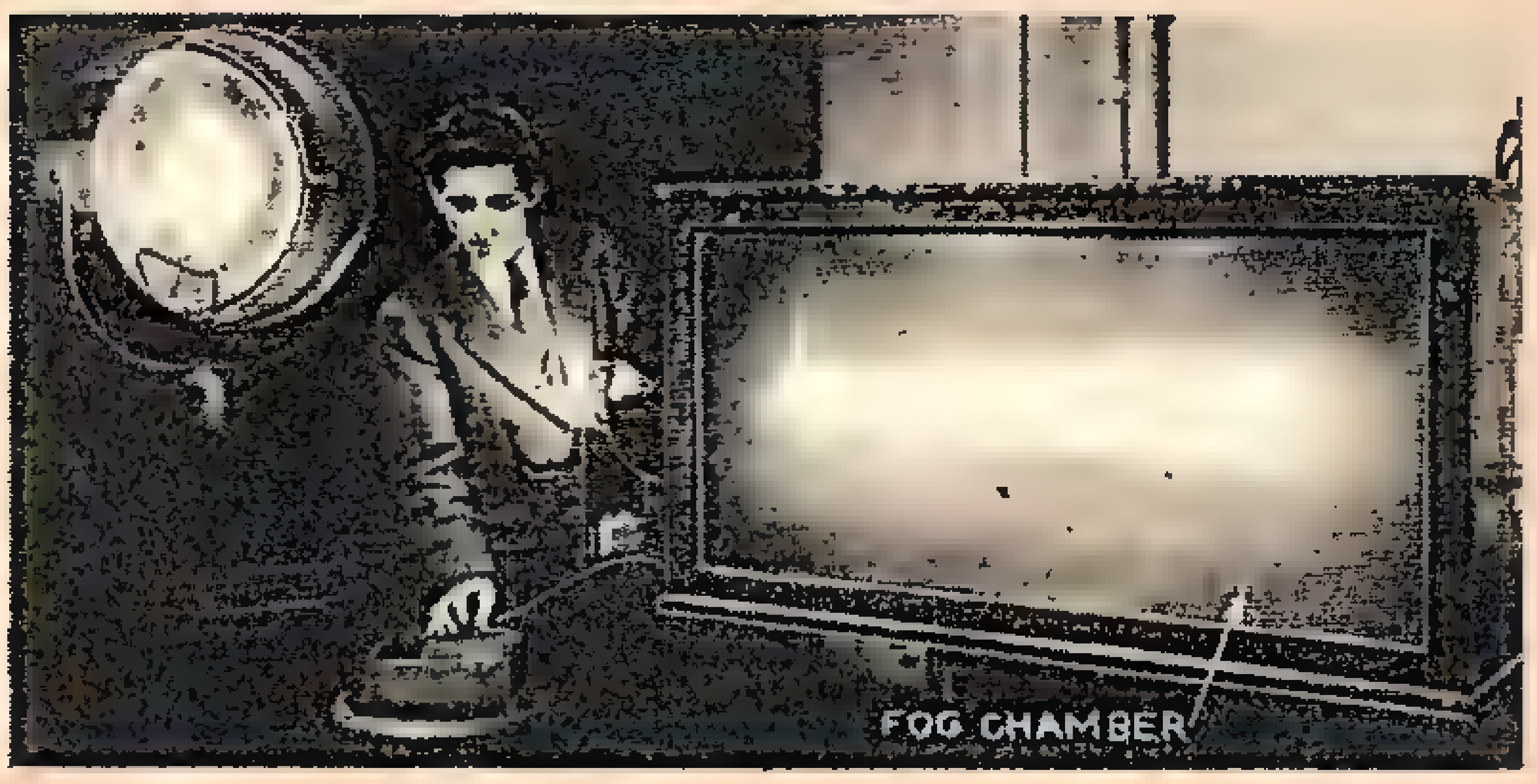
WASTE materials and almost every bit of discarded garbage are being used in the manufacture of inexpensive tile for use in Berlin's house-building program.

The discovery was made by Aretz, noted German chemist, whose tests have revealed the fibrous tile both tough and durable. Non-inflammable, it can be sewn, nailed, plastered or wallpaper-covered. The tile is claimed to possess the insulating properties of cork.

Aretz, famous German chemist, displays a slab of tile made from waste materials. It is a low-cost non-burning insulator.

Measures Light Intensity In Fog

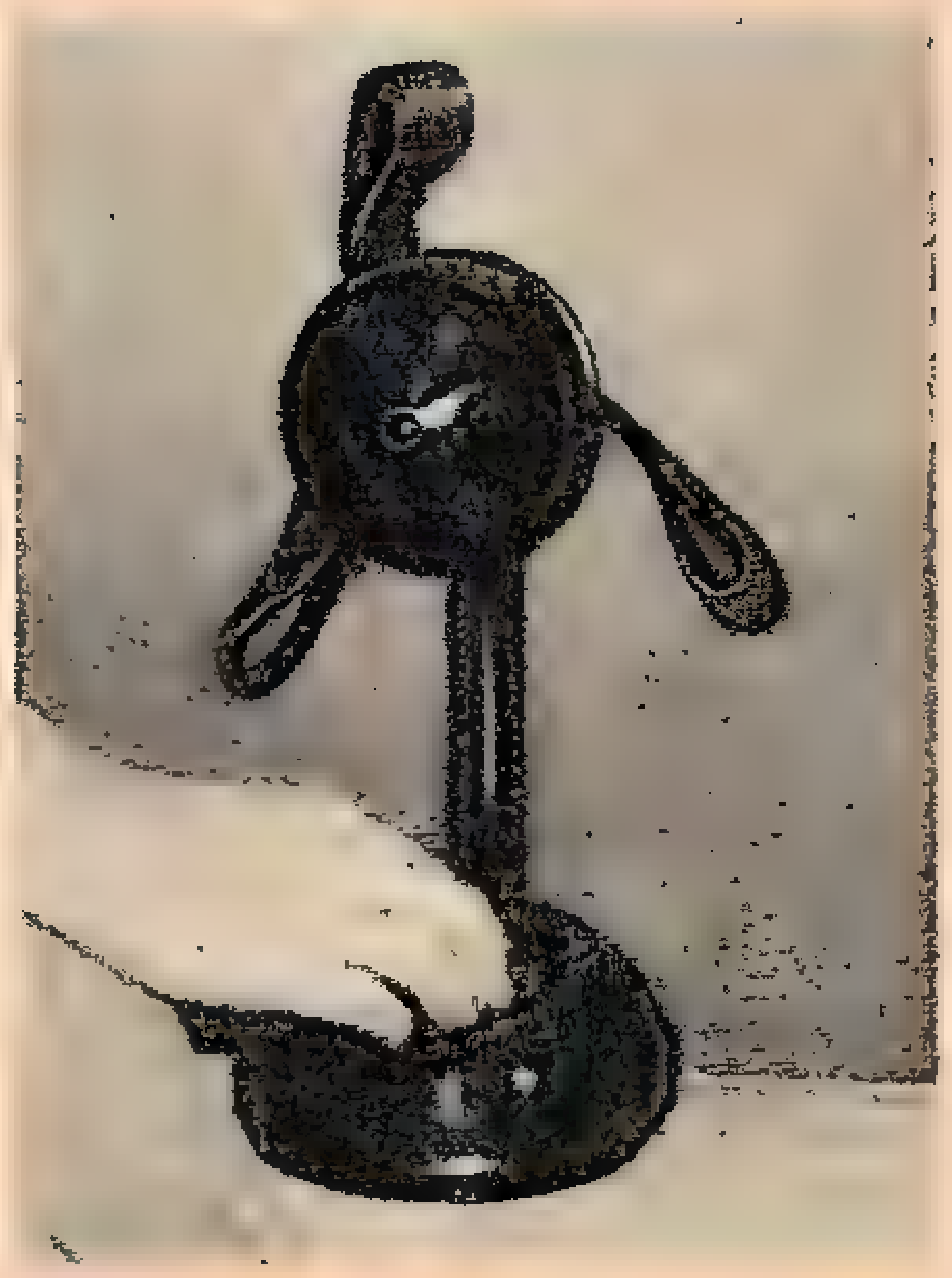
TO DETERMINE the decrease in intensity of light passing through layers of dust, fog or smoke, Westinghouse engineers use a laboratory "smoke box." A foot-candle meter mounted inside the box measures the change in beam intensity as the voltage across the lamp and the artificially-created "atmosphere" are varied within the chamber.



A light meter placed in the fog chamber measures variations in beam intensity as atmospheric conditions are changed.

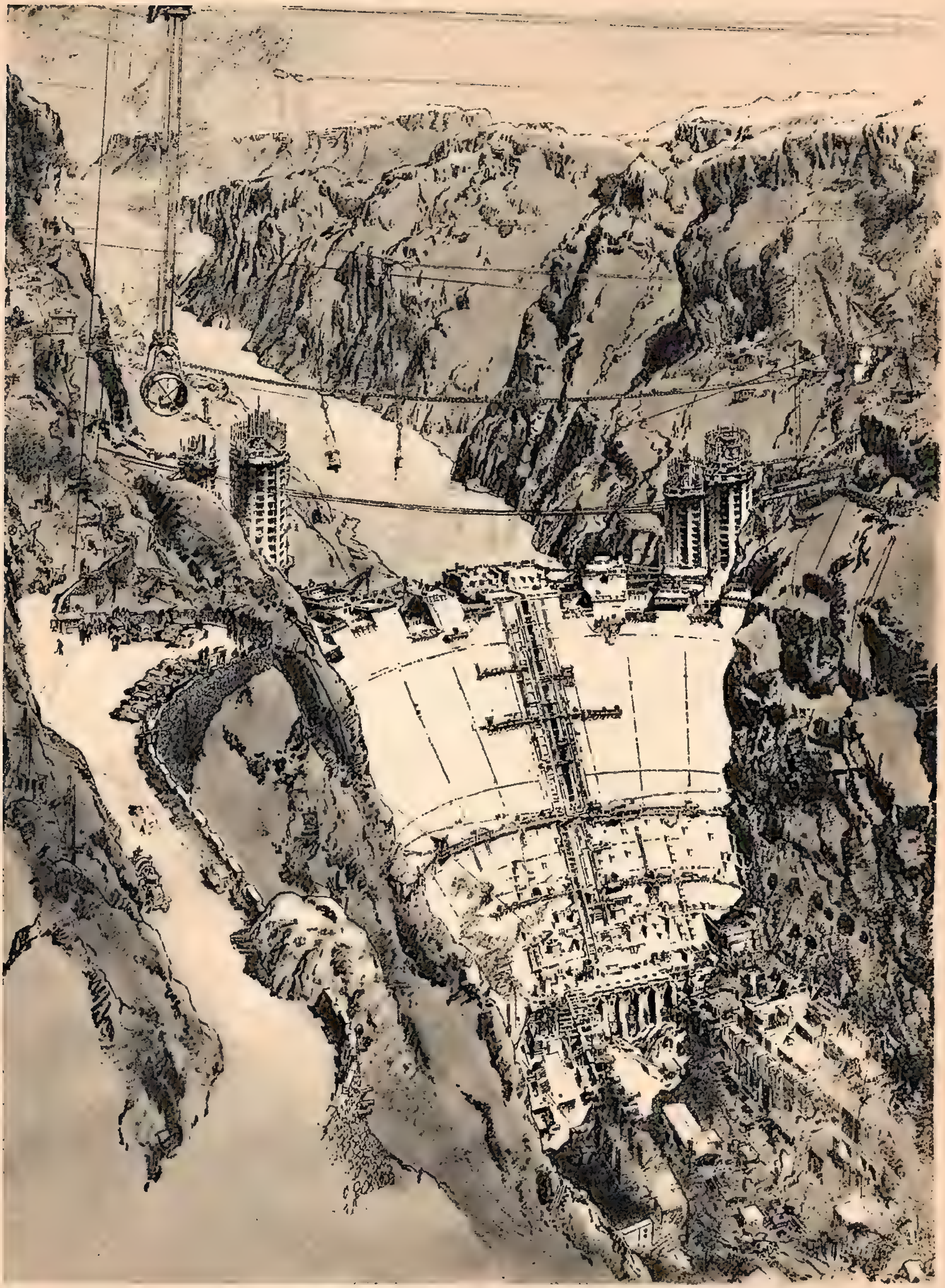
Harmless Fan Has Ribbon Blades

SILK ribbons, held in loops, form the blades of a harmless electric fan recently demonstrated at the Industrial Arts Exposition in New York. The ribbons give a standard pitch when rotating and are said to be able to throw a current of air ten feet away.



This looped ribbon fan is claimed to throw air currents ten feet away.

ARTIST SKETCHES WORLD'S GREATEST DAM



This recent sketch of Boulder Dam shows the greatest engineering project of its kind now nearing completion. Prepared by Charles H. Owens of the *Los Angeles Times*, this drawing gives an unusual view of the entire structure and shows an infinite amount of detail not revealed in the many photographs that have been taken of this huge $165,000,000 project.

Secrets of the Man

by **JAMES ARBAUGH**

as told to Annie Dyer Nunn

In this twisting somersault, originated by Arbaugh, he is just starting to bend down for the forward somersault to bar in hands of catcher at the right

Editor's Note: Today, after 27 years of life under the big top, James Arbaugh is considered one of the world's greatest artists of the flying trapeze. Hard work and cheering circus crowds are his life and happiness; read this story, told in his own words, of the thrills and dangers that await an aerial acrobat.

SELLS FLOTO circus was in full swing, and the Coliseum in Chicago was filled to capacity. All eyes were trained on the Flying Wards. I was one of them, nine performers skimming through the air nearly a hundred feet above the sawdust ring. In doing a double cut away to my wife, I was to catch to a bar in her hands, as she swung head downward to meet me. She was an instant too quick and hooked me under the knees! I just missed her face with my flying feet. I rode the swing to the end where I changed from my hocks to my hands and finished the act as usual.

The house roared. Apparently, we had done an extremely clever trick. No one guessed that the stunt was unheard of, or that I had barely escaped a terrific fall and Mrs. Arbaugh a facial injury.

Because you've never seen a trapeze actor fall, don't imagine we are immune. We have plenty of falls and our minor injuries are legion. I've seen leapers get their teeth knocked out by flying bars, and have had the arteries in my arms, and in those of my catcher, burst from the impact when I came out of a full double twister. But, comparatively speaking, our actual crack-ups are few. I have had four, the worst being in Minneapolis when I got a shoulder so badly dislocated it required the combined strength of four men to pull it back in place.

A DICTIONARY OF THE FLYING TRAPEZE

CASTING	Losing control of mind and body for a short or long interval while whirling through the air.
CATCHER	A performer who hangs from a trapeze, catching acrobats who fling themselves through space.
DOUBLE CUTAWAY	A backward somersault to a bar in the hands of the catcher.
DOUBLE TWISTER	A difficult trapeze trick including a pirouette and a somersault.
FULL DOUBLE TWISTER	Two somersaults and a pirouette.
HOCKS	The legs of aerial acrobats.
MECHANIC	A safety belt with rope, used to prevent falls when practicing new trapeze stunts.
NET	A strong but resilient cord netting stretched about six feet above the floor, directly under the trapezes.
PIROUETTE	A whirl in perpendicular fashion from left to right, in the air.
T BAR	A small trapeze inside a larger one.
TRAPEZE	A short horizontal bar suspended from rigging by two parallel ropes.
TRIPLE SOMERSAULT	Three head over heel spins through the air.

In this connection, a comparison of the records of Alfreda Cordona and Ernest Clarke, among the greatest of trapeze performers today, is interesting. Clarke has never had a serious accident in his life; while Cordona has had several, and even now is training to come back after a frightful shoulder injury received a year ago when

On The FLYING TRAPEZE

A split-second error in timing means a fall and possibly serious injuries, despite the net, in aerial acts like this.

doing a triple somersault. Perhaps he is a bit more reckless than Clarke, who prides himself on never taking any unnecessary risks.

Cordona did not use a mechanic when learning the triple somersault; it was in his way, he said. A mechanic is a heavy leather belt about the waist of the performer, attached to ropes suspended from the ceiling of the gymnasium. A person on the ground watches the contraption and keeps the performer from falling by taking up the slack in the ropes. Of course, this is used only in practice work.

On the other hand, Clarke favors a me-

[*Continued on page* 144]

Left to right: Irma Ward, America's premier aerialist, James Arbaugh—author of this article and his wife, Jessie Arbaugh, who sometimes acts as his catcher.

CIRCUS ODDITIES

OVER 24 MILES of rope and cable are used in the aerial riggings of the Ringling & Barnum circus when in Madison Square Garden, New York City. Under the big top this figure increases to 41 miles. There are 60,000 feet of rope in the meshes and guy ropes of the nets alone.

THE "MAIN GUY" of a circus is not the boss, but a wire cable holding the center poles in place.

JENNIE ROONEY, with a star double trapeze act to her credit, gets dizzy when she looks out of high windows. Elevators frighten her!

HELEN WALLENDA, member of the Wallenda act performing breathtaking stunts on the high wire, fainted when she first saw a newsreel showing of her act.

A TRAPEZE BAR BREAKS each time Mlle. Gillette, a newcomer to the American circus world, goes through her act! Poised 60 feet above the sawdust ring, with no nets below, she dives headlong for a trapeze fifteen feet away. The bar splinters, down and down she tumbles, to be caught in the nick of time, a few feet above the ground, by a pair of wires.

MALTESE CROSS RIGGING is used by Papa Otari and his family of aerial acrobats. Trapezes are arranged along the bars of the cross, rather than in one line. Performers work in two directions, whizzing past each other in mid-air. A collision or even a slight touch might mean disaster.

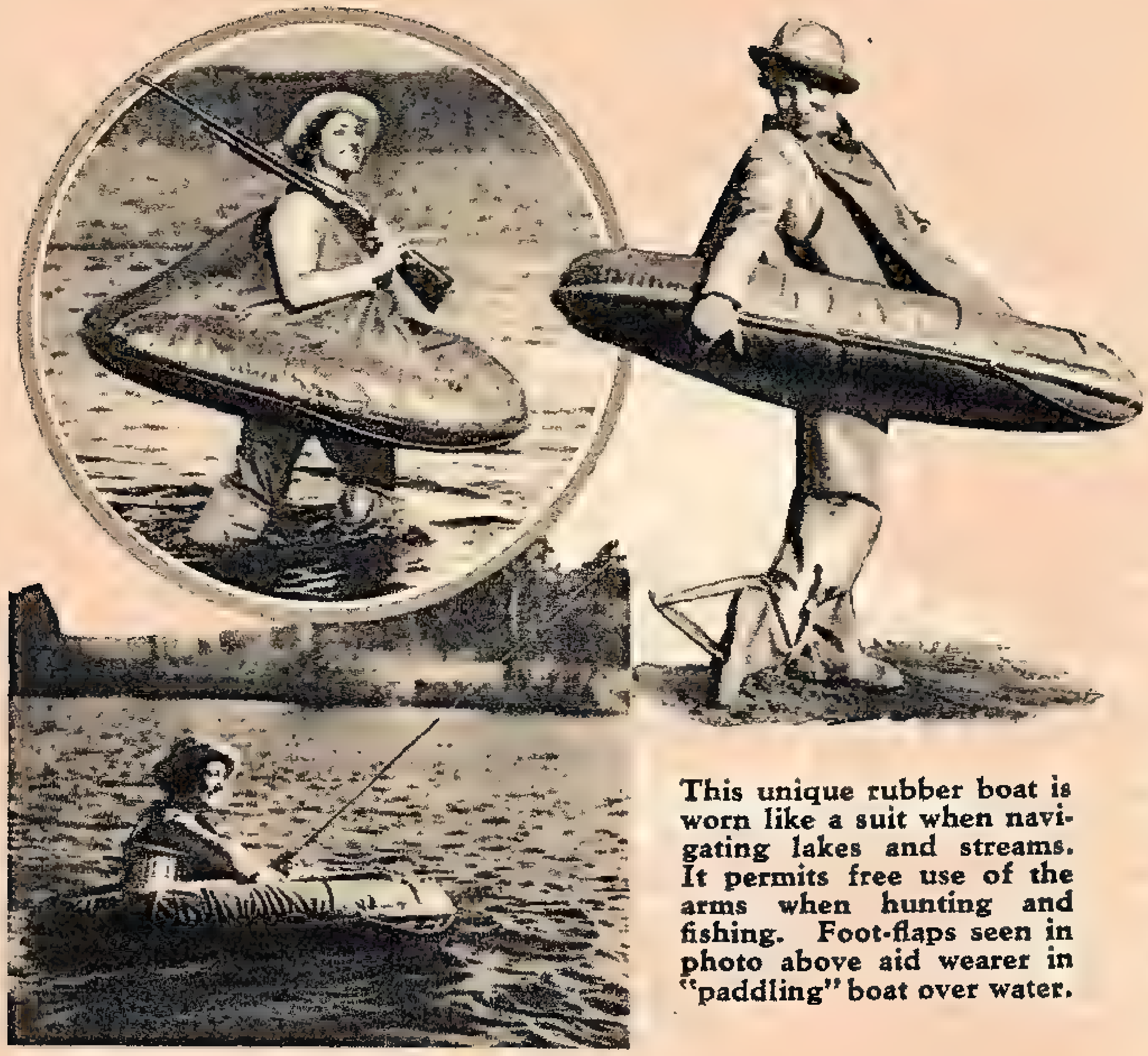
A TROUPE MANAGER pays his performers according to what he thinks they are worth. Though Alfredo Cordona could get dozens of good catchers for $75 a week, he paid his brother Lalo $125.

CATCHING 200 CUES for that many different numbers, the Merle Evans band plays continuously for three hours at each Ringling & Barnum performance.

A POLICE DEPARTMENT is carried along by every big circus. John Brice, chief of the Ringling police force, knows more American chiefs of police than anyone else.

CLOWNS COPYRIGHT their faces. Once a clown appears in the ring with a new facial make-up he has developed, no other clown will copy it. Felix Adler, most famous of the "Joeys", has a red electric light at the end of his apple-like nose.

Wades in Rubber Boat to Hunt and Fish



This unique rubber boat is worn like a suit when navigating lakes and streams. It permits free use of the arms when hunting and fishing. Foot-flaps seen in photo above aid wearer in "paddling" boat over water.

A DOUGHNUT - SHAPED wading suit, which literally enables the hunter or fisherman to go walking on water, is the latest aid for the sportsman.

The buoyancy outfit is made of rubber and may be inflated with an ordinary pump. When blown up sufficiently to support the wearer in water, the sportsman steps into the rubber circle, sliding his head through an opening in the webbing. In this way the suit is supported at the crotch and shoulders and permits free movements of the limbs. High top rubber boots are of course essential.

The portable doughnut is launched by wading out into the lake until the boat floats on the surface. Foot-flaps attached to the boots propel the boat as the legs beat the water. The boat is claimed to be equally suited for duck-hunting as well as fishing in heretofore inaccessible spots.

Pilots Train In Strato-Chamber

A SPECIAL stratosphere squadron is being trained at Mount Celio, to help Italy retain her mastery of the upper air.

To be eligible for the squad, pilots must undergo severe medical tests. They are placed in a huge air chamber where conditions encountered during an icy, gruelling climb into rarefied air are reproduced. Thin air usually found 60,000 feet above the earth is "manufactured" in the chamber. Students must breathe this air for several hours without showing ill effects.

Roads "Soaped" to Resist Water

SOAP emulsion mixed with oil recently was found to be more successful in treating the surfaces of Missouri's country roads than when oil alone was applied. While oil-treated soil slaked down in a day, the addition of soap made the surface resistant to water for more than a year. Two trial roads were built for the special laboratory tests.

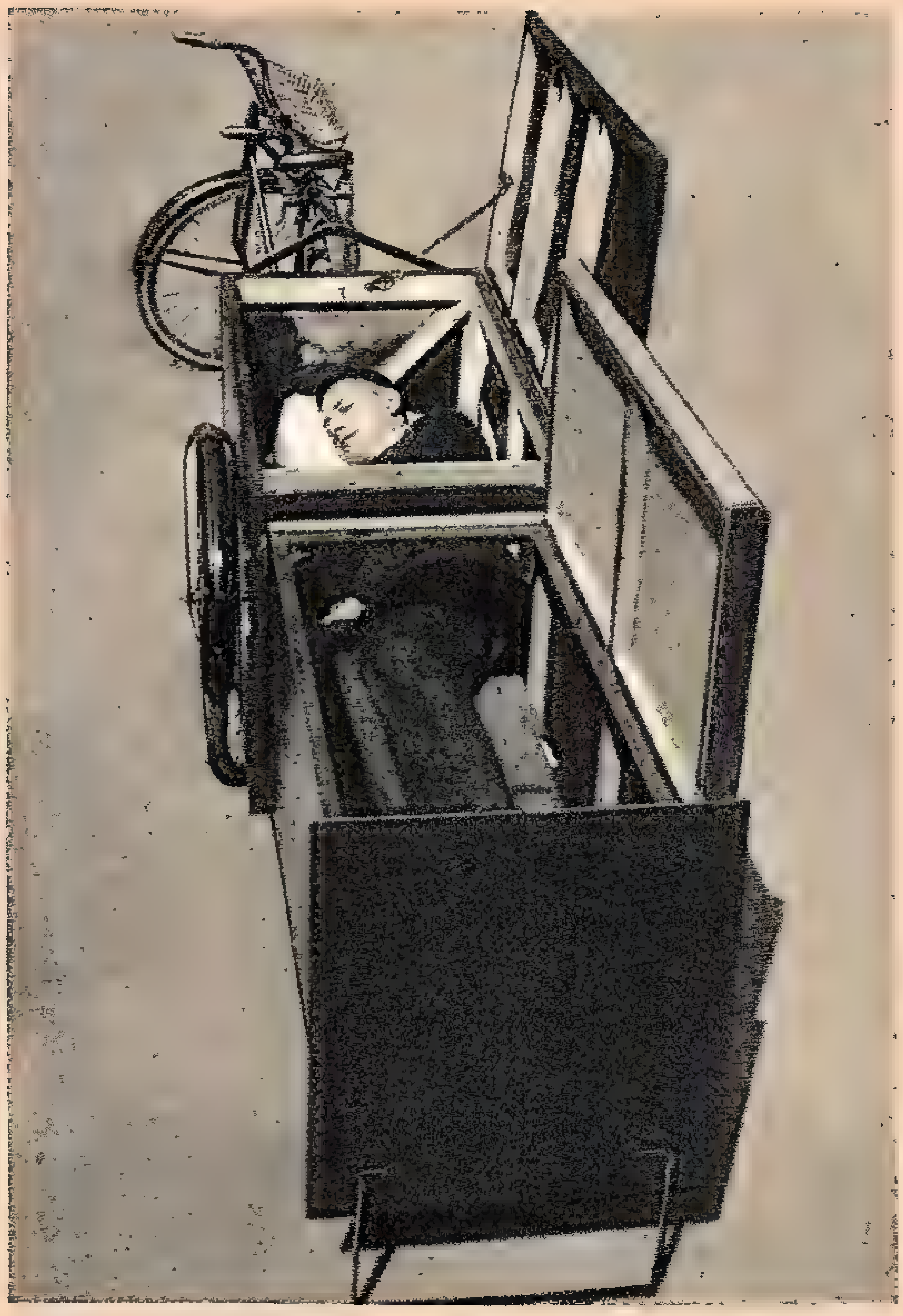
Italy is making a determined effort to retain the stratosphere record which she now holds for high-flying airplanes. A "strato-squadron," to which only pilots of ability who have passed severe tests can belong, has recently been formed. Major Pezzi-Glario (center) in picture at left above heads the squad. Right—Aspirant breathing thin air in stratosphere chamber.

Collapsible Bike Trailer Has Comfortable Bunk for Camper

A COLLAPSIBLE bicycle trailer which can be converted into comfortable sleeping quarters has been built by Joseph Dorocke, 25-year-old Chicago youth. With it he intends to make an 8-months bicycle tour of America, retiring at night in his ingenious sleeping compartment.

The trailer resembles a box camera with an extended bellows. Ready for travel, the 50-pound outfit measures only four feet long and two feet square. It is supported on the road by two standard bicycle wheels.

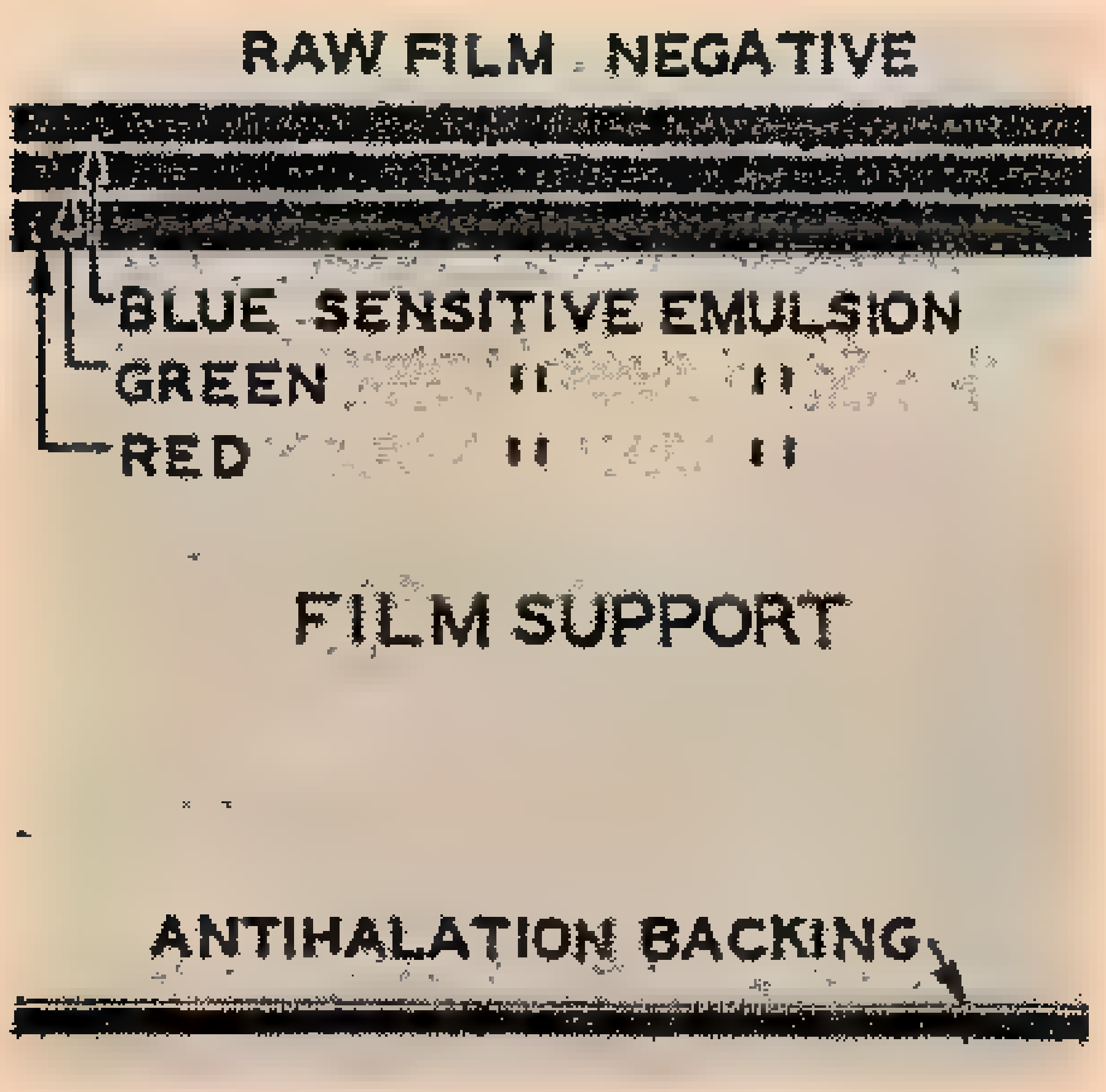
When an inner compartment is pulled out, the enclosed bed extends to eight feet, furnishing sufficient space for the average person. The roof is hinged and may be closed in case of adverse weather.



Joseph Dorocke of Chicago is shown asleep in his home-made bicycle trailer. When traveling, the extended compartment slides into the compact four-foot "pullman" box.

Color Movies Require No Filters

NATURAL color movies for amateur cameramen are now possible by a new process which coats the film base with emulsions sensitive to red, green and blue, thus eliminating the need for special filters in average filming. The emulsions are separated by gelatin layers. An extremely complex system is used in processing the finished print. One stop larger than usual is required in making color movies with the new film. Filters are recommended only in haze-cutting and color correction in artificial lighting.



Above sketch shows cross-section of new 16 mm. color film. Note the three-color sensitive emulsions separated by gelatin layers. Ordinary filming requires no filters.

Streamlined Twin Hits 104 m.p.h.

BREAKING all rail records between Chicago and the Twin Cities, one of the Burlington road's new streamlined trains recently hit a top speed of 104 m.p.h. during a test run. The 431-mile run was made in slightly more than 5½ hours at an average speed of 77.5 m.p.h. The twin trains now operate on a regular 6½-hour schedule at 66.2 m.p.h. between Chicago and St. Paul.

The Burlington's streamlined twins are shown at the Chicago station. In recent tests a speed of 104 m.p.h. was attained.

New Ice Sheet May Crush Earth

A MOUNTAIN of ice, encircling the globe and snuffing out all civilization, is predicted by Dr. Max Waldemar Kurniker for 20,000 years hence. Dr. Kurniker points to the coming of a new ice age which, together with the gradual movement of the moon closer to the earth, foreshadows a catastrophe several thousand years into the future. The sudden deluge will descend from the north, crushing New York and turning Los Angeles into an arctic waste.

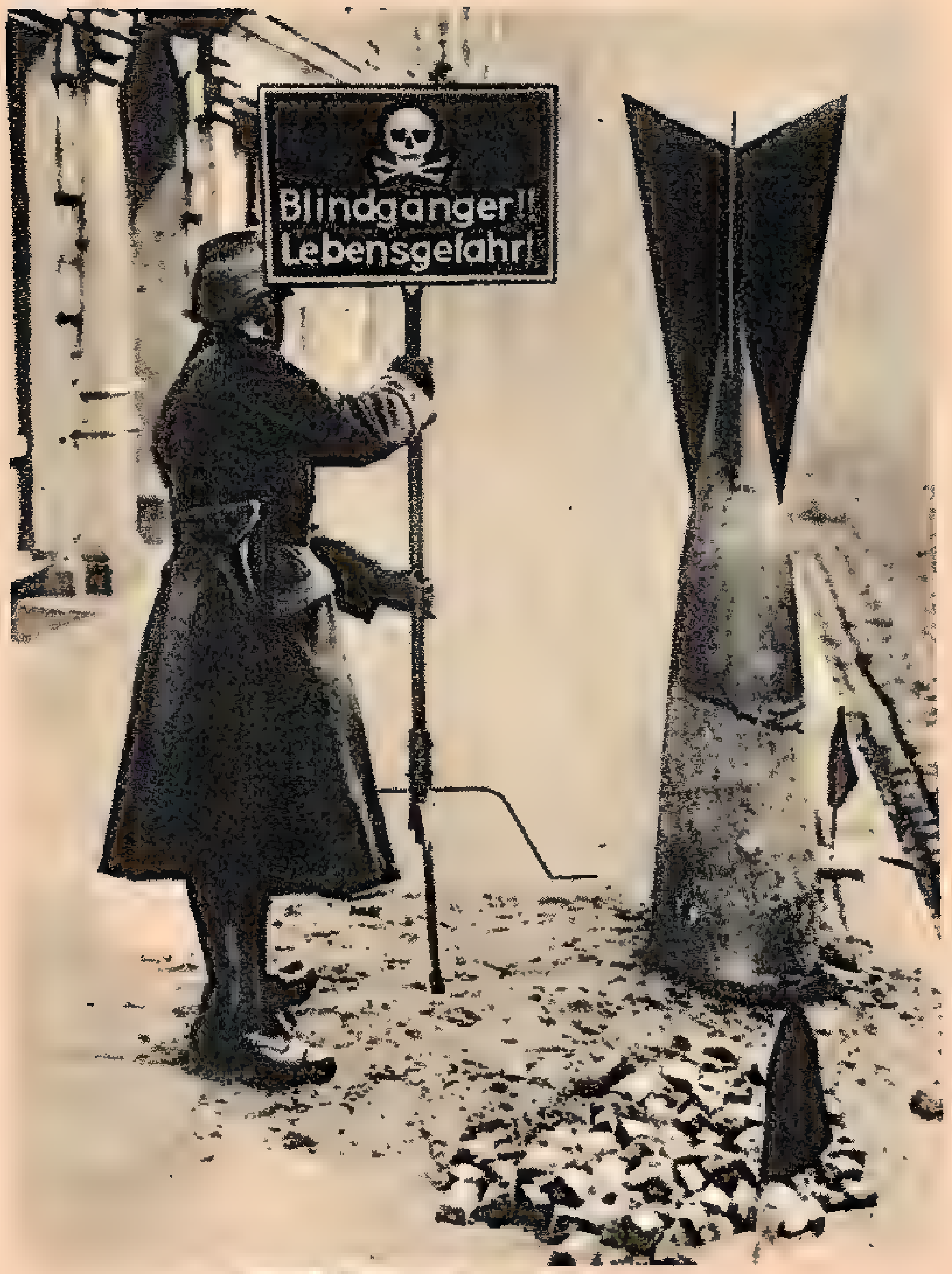
DEBUNKING *Poison*

by CAPTAIN GEORGE J. B. FISHER,
Chemical Warfare Service, U. S. Army,
as told to James Nevin Miller

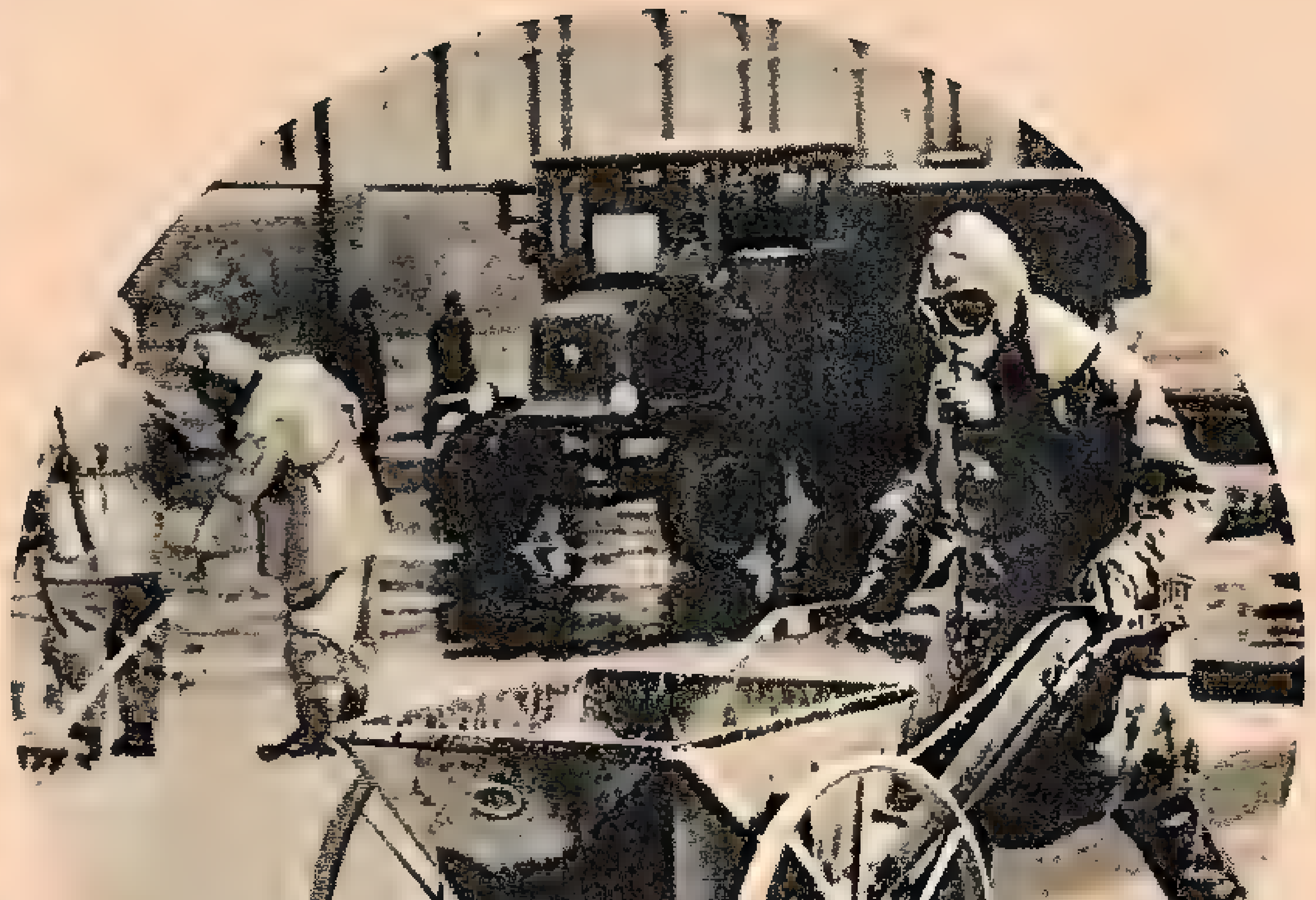
ENORMOUS cities blanketed with death-dealing gas fumes. Citizens rushing about in panic as enemy planes roar overhead. Thousands of lives snuffed out in a few minutes. Countless humans coughing and screaming with fear, fighting among themselves to reach subterranean gas-proof cellars.

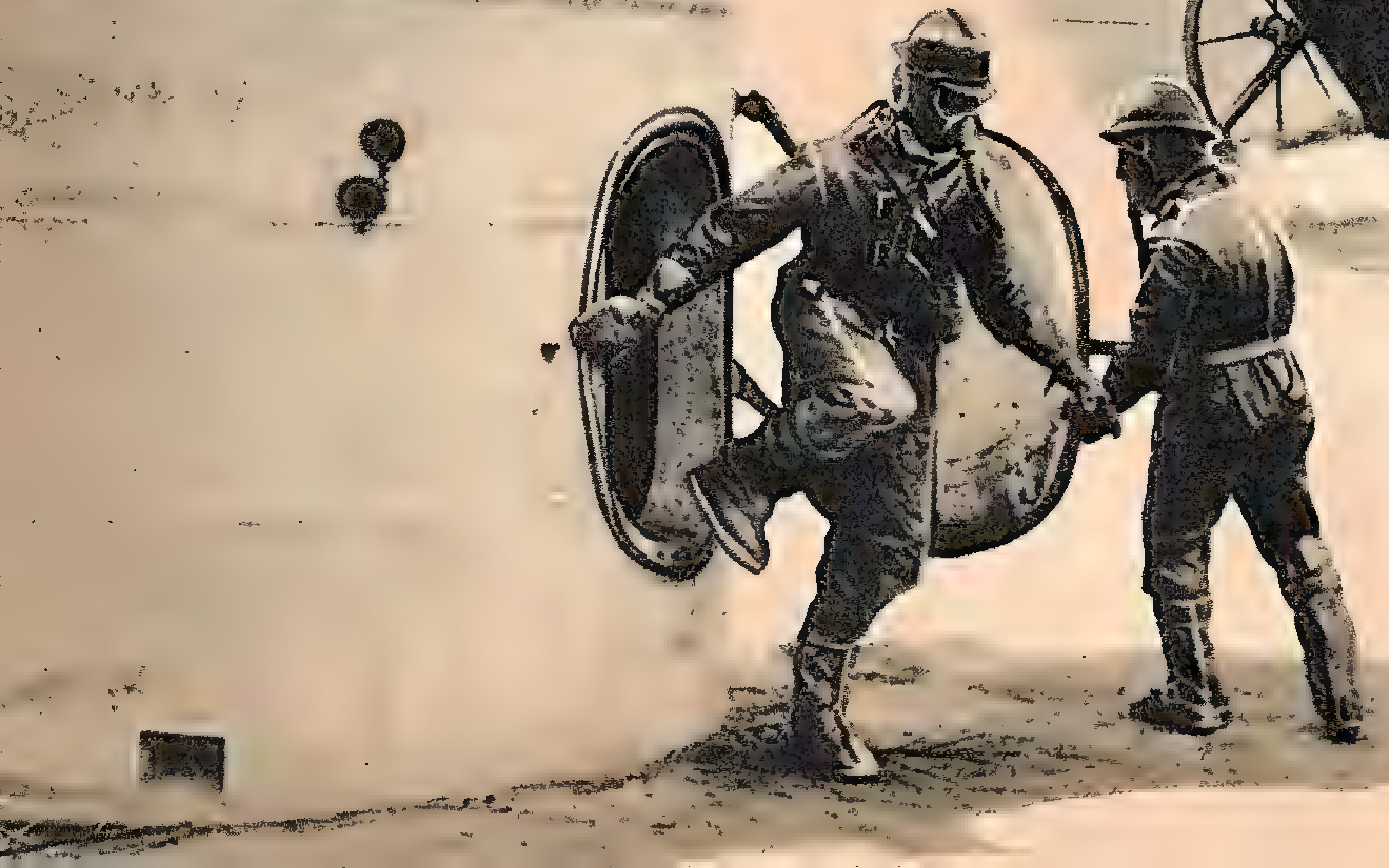
This is the terrifying picture so frequently painted by fiction writers, the movies, and the sensational press about the horrors of poison gas in the next war.

But is the picture a true one? Is there any basis in fact for it? No, says the Chemical Warfare Service of the United States Army. After more than twenty years experimentation with every kind of poison gas known to science, the nation's acknowledged authority on the subject has come to the conclusion that gas is the "bogey man" of war.


Blindgänger!!
Lebensgefahr!

During mimic bomb and gas attack on Berlin, German soldiers set up signs warning citizens their lives were in danger. City was plunged in darkness, civilians hid in cellars during raid.





Above—Berlin street cleaners, attired in gas masks, counteract effects of poison gas by washing streets with special preparation following mimic air raid. Left—Transportable shelter developed by France to save civilians during gas attacks. During raids, rescue workers set up shelters, find overcome citizens, and revive them in the shelter which holds 5 persons.

Gas WAR SCARES

Europe is preparing for war. Her people are being drilled to use gas masks and to fight poison gas air raids. Will deadly gas wipe out American cities, destroy U. S. armies? Here are an expert's views on this "bogey man" of war.

Uncle Sam's chemists, convinced that the public has a right to know the real facts, even go so far as to say that as much as 12,000 tons of mustard gas, most devastating of all war time gases, could not possibly wipe out a big city's population. Not once in history has an aerial gas attack ever been launched against a city. While this method undoubtedly will be tried in the next war, such an attempted slaughter of defenseless millions actually is no more and no less than a fantastic dream.

Even in the World War, with hundreds of thousands soldiers massed in open fields, apparently perfect targets for aerial gas attacks, this method was not as destructive as other weapons of war. To prove this conclusively to the skeptical-minded, the Chemical Warfare Service cites these facts and figures. As little as 20 milligrams of mustard gas absorbed into the lungs will cause death. At first glance it would seem, therefore, that 12,000 tons of this chemical could wipe out a third of the population of the United States. However, this quantity of mustard gas was actually used during the World War. True it incapacitated 350,000 men. But only 2.5 per cent of them died. Thus

GAS IS EFFECTIVE WEAPON SAYS EUROPEAN EXPERT

Although he admits that poison gas is the least destructive weapon in modern warfare, Dr. Herbert Levinstein, one of the leading poison gas experts on the Allied side during the war, declares it is one of the most effective weapons for incapacitating enemy troops and throwing civilians into panic.

He claims that gas has not made war more dangerous because only a small percentage of gas casualties result in death.

"It has introduced fresh possibilities of effecting a strategic surprise which is quite different," he said. "Far more destruction of property, greater mortality and suffering are caused by dropping high explosive or incendiary bombs from aircraft than by using gas-filled bombs or shells."

He added that gas probably would be more effective, however, because it caused panic among uninstructed, unprotected civilians.

Smoke screens laid over a city by planes will make it difficult for enemy air raiders to launch bomb and gas attack. To drop gas raiding planes must fly low, making them vulnerable to anti-aircraft fire. No gas raids were attempted during the World War.

it took an average of a ton of gas to injure every 29 victims and a ton and a half for every death!

There is a very simple reason why most poison gases are not more destructive and that is because weather conditions tend to reduce the harmful chemical effects to a minimum. A wind blowing at the rate of only four miles per hour, for instance, can move a huge cloud of deadly gas from a given region at the rate of 352 feet per minute. Result? Much of the chemical will be carried away over the heads of the people intended to be destroyed.

From the military standpoint, according to army experts, a gas attack on a city would scarcely pay. And in the case of such a contemplated attack the pure gases would be out, for obvious technical reasons. Take phosgene gas, for instance. This gas must be released from the ground and in great clouds to produce any material results. The airplane is not adapted for this. It can drop a cloud of smoke which hangs for a few moments while hiding some important operation. But the dispersion of lethal gas in this fashion is physically impracticable.

Nor can gas bombs be used. Simply because it would be impossible to concentrate enough gas to justify the action.

In the case of an aerial gas attack only liquid chemicals are of much value. And in making an attack on a city with a liquid sprinkler it would be necessary to fly low. Towering city buildings would preclude such an operation and the canyoned depths would never be reached. In fact the low flying planes would be shot down by anti-aircraft guns before the attack got well under way.

Lewisite, the deadly gas developed after the World War, a dark green fluid, might be dispersed in some fashion over a city and down into the streets. But water would quickly wash it and its poisonous vapors away. Should the gas rise from the ground, it would scarcely drift above second floor windows.

When poison gas was introduced by Ger-

[*Continued on page* 131]

Berlin realistically used ambulances and cared for "wounded" during mimic raid testing city defenses.

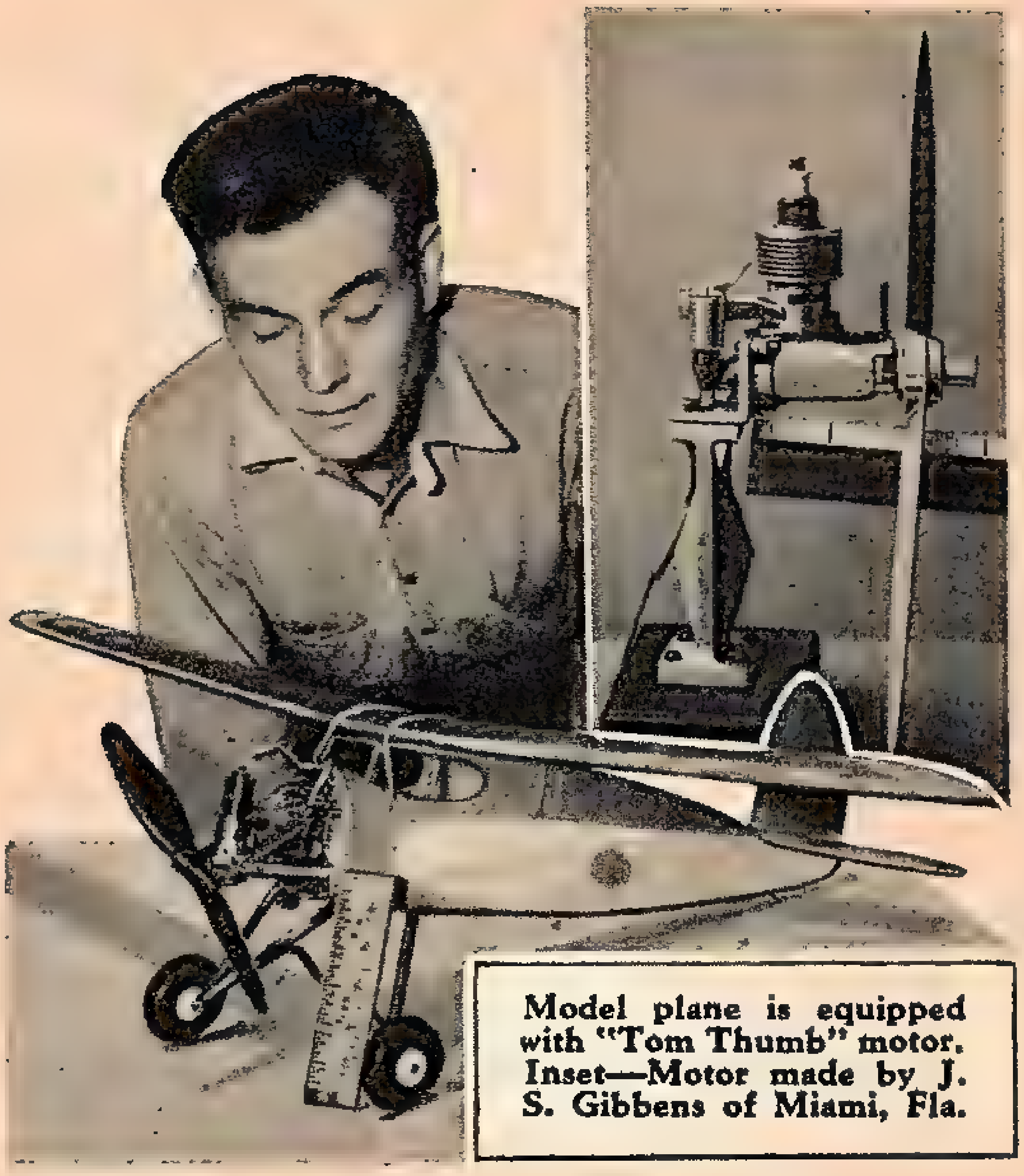
Training army officers at U. S. Chemical Warfare School at Edgewood Arsenal, Md. Officers learn to identify various poison gases by smell and prepare defense against them. Chemical cylinders are being used above.

World's Tiniest Gas-Driven Engines Propel Model Planes

WHAT are claimed to be the tiniest gasoline-driven airplane motors in the world have been designed for use in model aircraft.

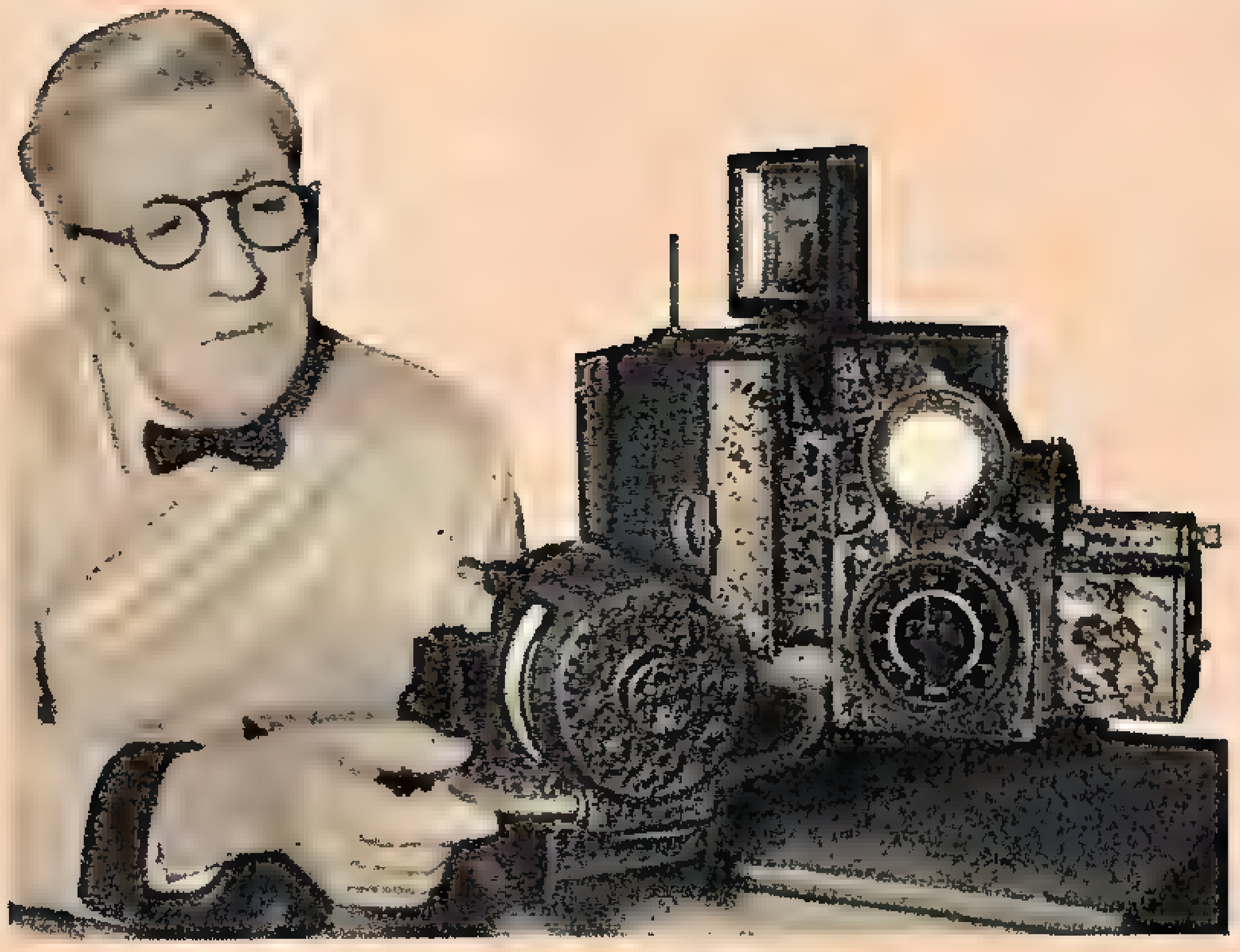
One of these "Tom Thumb" engines, shown in the photo at right with its co-inventor, Roland H. Barney, weighs only two and one-half ounces and makes 4,000 r.p.m. A miniature gas tank carries one-quarter ounce of fuel which insures six minutes of flying. The plane itself is said to reach an altitude of 550 feet and a speed of 20 m.p.h.

Another 1/10-h.p. midget is equipped with carburetor, throttle and spark control. Carburetor and spark plug together are only ¾ inches tall. The hollow crankshaft in the 2-cycle engine is made of spindle steel.



Model plane is equipped with "Tom Thumb" motor. Inset—Motor made by J. S. Gibbens of Miami, Fla.

Attachment Gives Movies Depth



W. F. Alder, California research scientist, developed the "polyscope", shown above, in his garage-laboratory. With it three-dimensional movies are made and projected on screen.

THREE dimensional motion pictures, long sought in commercial filming, are claimed to have been achieved by W. F. Alder, Pasadena scientist and former movie research worker.

The "polyscope," an accessory which is attached to the camera, gives the desired depth. No special device is needed in projecting the film.

Electric Shock to Replace Whip

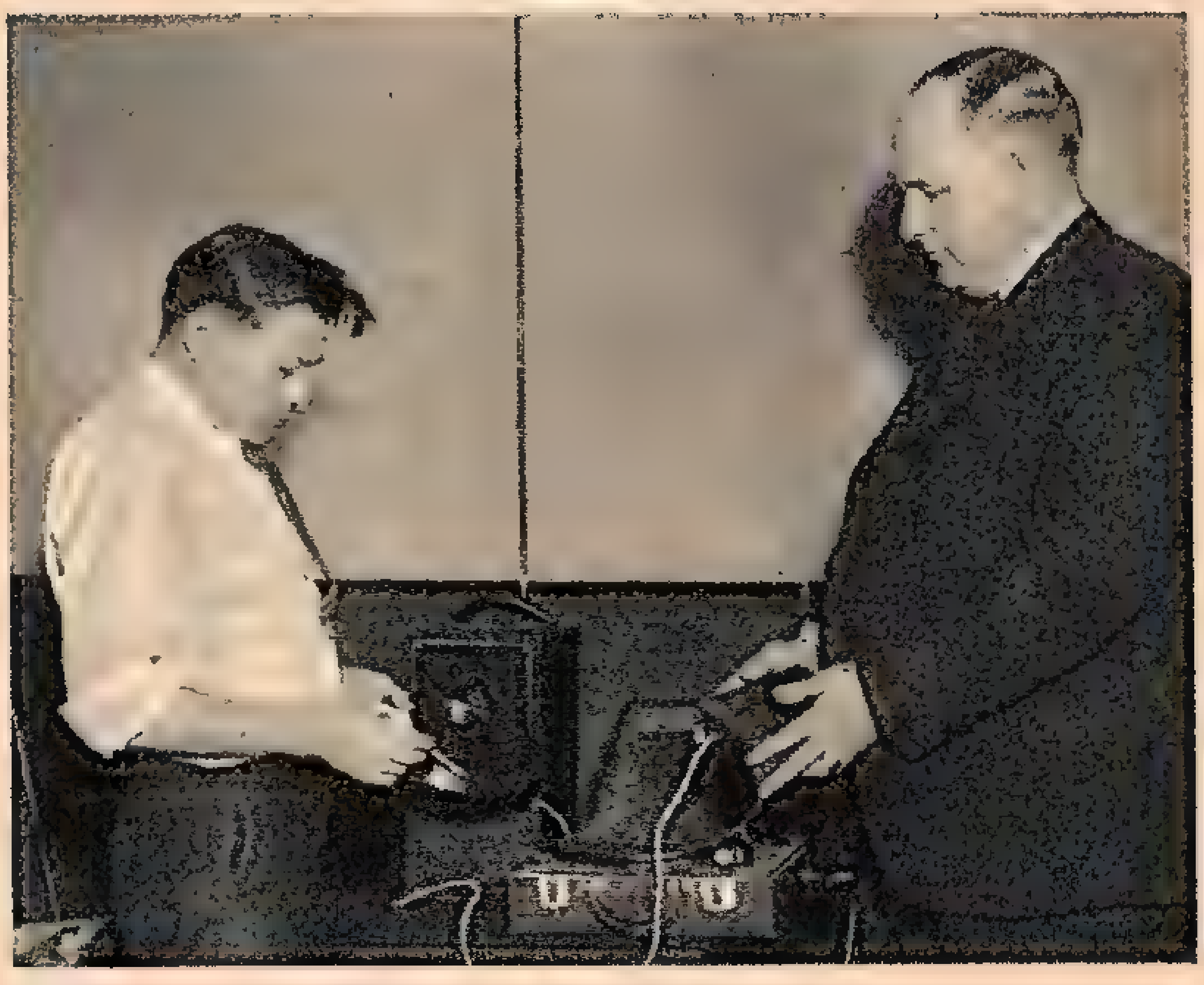
AN ELECTRIC spark may replace the old-fashioned whip in goading animals onward. Exhibited at the Leipzig Fair, the electro-whip consists of a cane containing a battery which delivers a shock when the animal is touched. The current shuts off when the cane is raised.

Phonograph Alarm Radios Police

A NEW radio burglar alarm system automatically broadcasts a warning to squad cars and police headquarters, thus eliminating the delay in relaying messages.

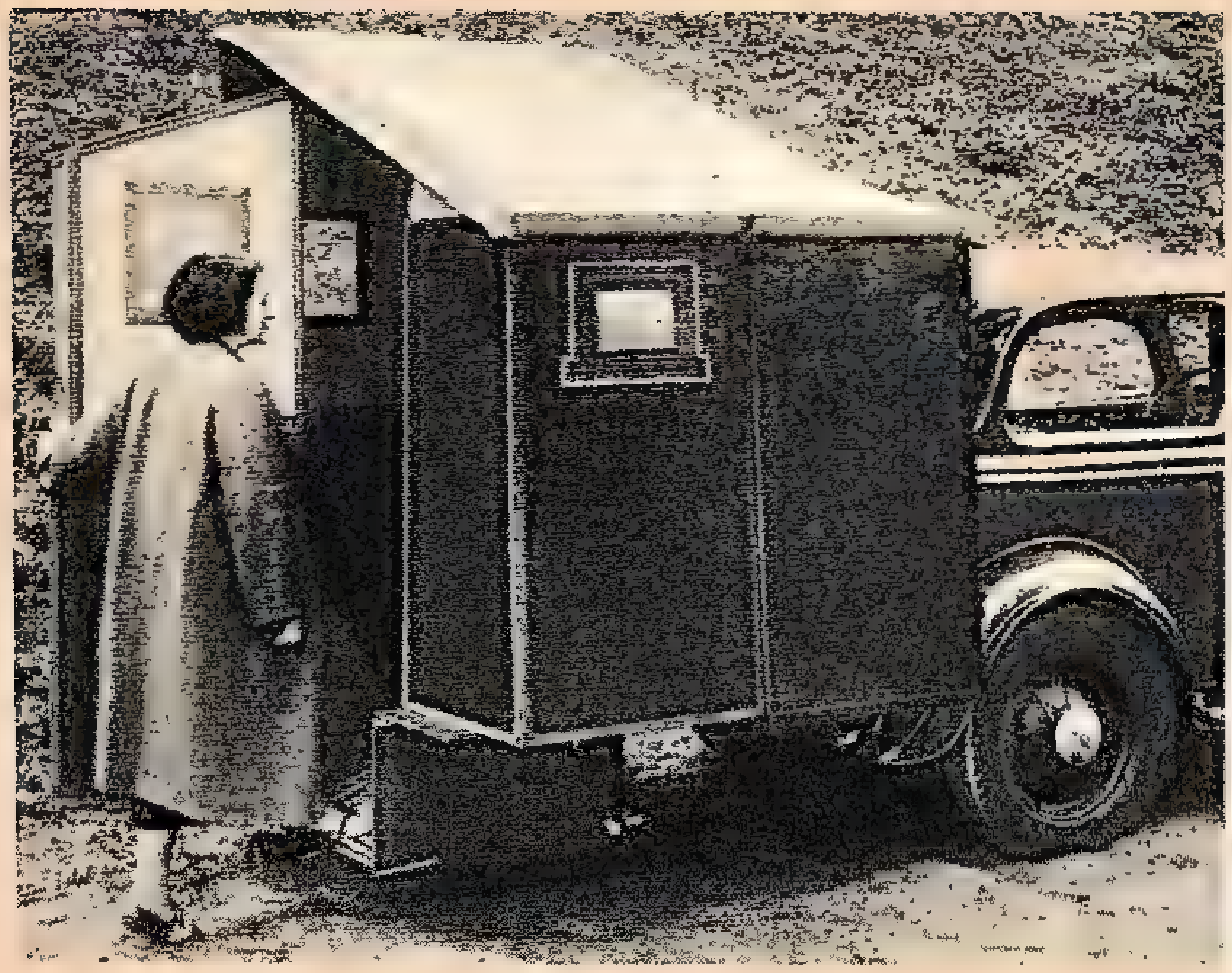
The alarm is placed in banks and other places subject to burglary. It consists of a portable radio transmitter, an electric pickup arm and a phonograph turntable and record.

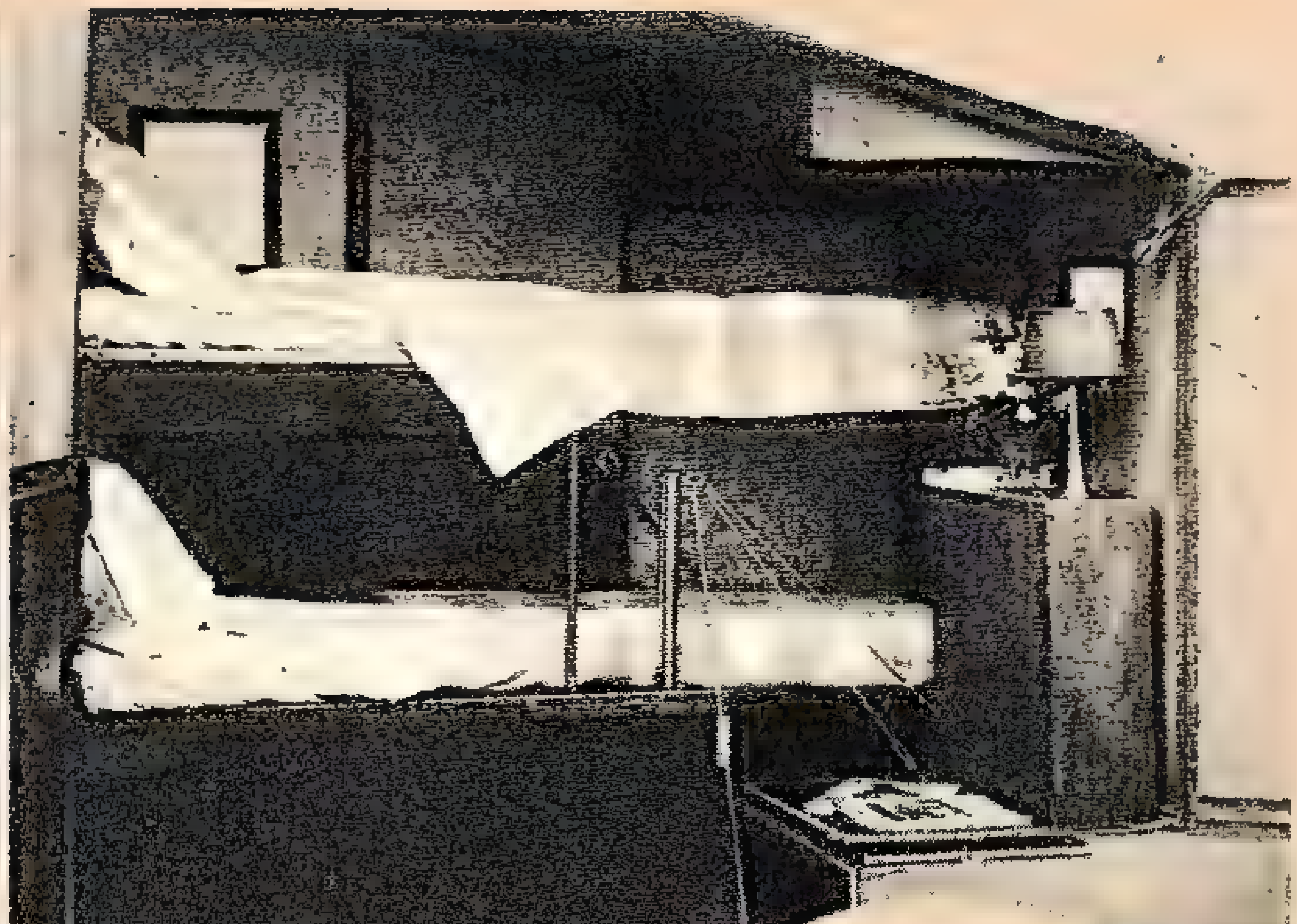
During a holdup, the circuit is broken, by a manual switch or interruption of an "electric eye" beam, causing the turntable and transmitter to broadcast an alarm which gives the location of the scene of the robbery.

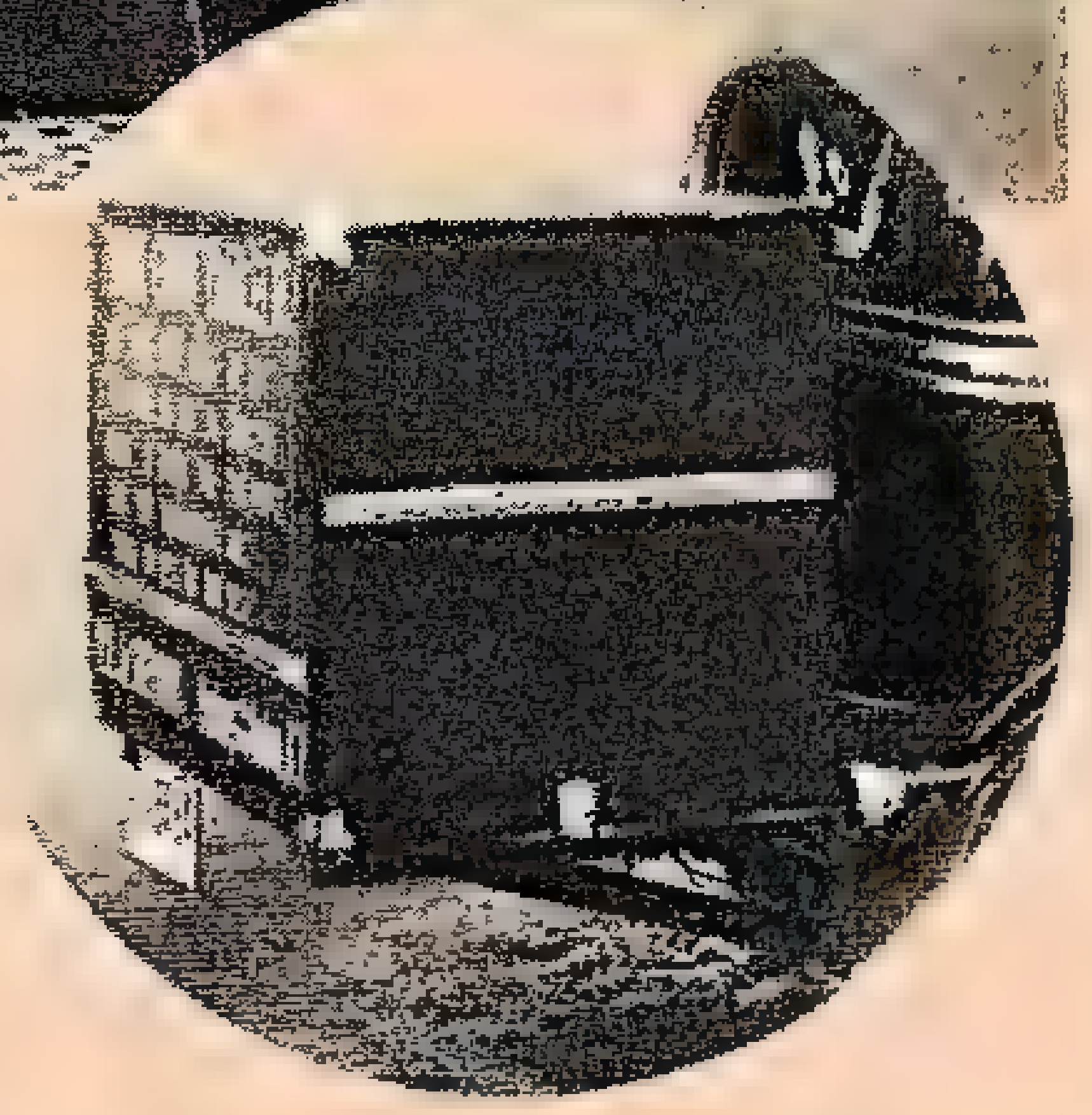


Harry Mackley, Peoria's police radio supervisor, left, demonstrates his radio burglar alarm which broadcasts phonograph disc warning direct to squad cars when circuit is broken. The device is concealed in buildings subject to holdups.

Automobile Trunk Opens to Form Wheel-less Cabin Trailer







Left above—Collapsible cabin trailer, which folds into trunk, is seen ready for occupancy. Right above—Interior of trailer showing two-bed sleeping accommodations. Actual size of cabin trailer when ready for travel is shown in circle at right.

A COMPACT cabin trailer which folds up into a trunk when not in use has just been devised by W. N. DeSherbinin of New York.

The trunk is only slightly larger than an ordinary compartment, and can be carried behind the average car without obstructing rear window vision. When made ready for use, it opens up to ten times its original size.

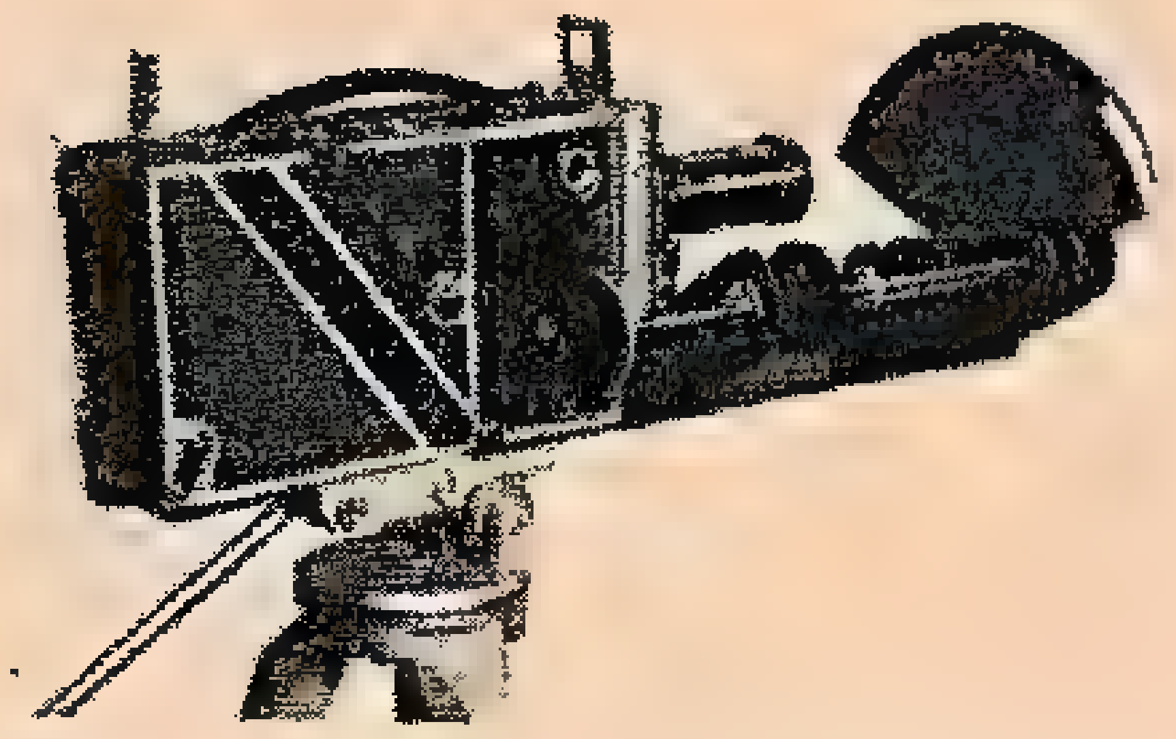
Wall panels are hinged, while the roof consists of canvas stretched taut. Equipped with four windows and a door, the cabin is sufficiently large for two persons. The floor is made low enough to permit a person of normal height to stand upright. The bunks are double-decked.

Practically all the conveniences a touring motorist might ask for are found in the collapsible trailer. In addition to increasing driving safety, the trunk cabin can be set up quickly when camp is reached.

Tom Blake, surfboard expert, is shown riding a surfboard equipped with sails. The new fad is gaining much popularity.

Movie Device Wipes Out Scenes

AMATEUR movie scenes may be "wiped" or faded off the screen without the usual abruptness by a new trick device. A semicircular revolving disc, mounted in front of the lens, is geared to the camera motor. As the disc rotates, each successive frame has a greater portion of its area blocked off. After rewinding film to start of fade, the next scene is superimposed on dark unexposed portions of the preceding frames.



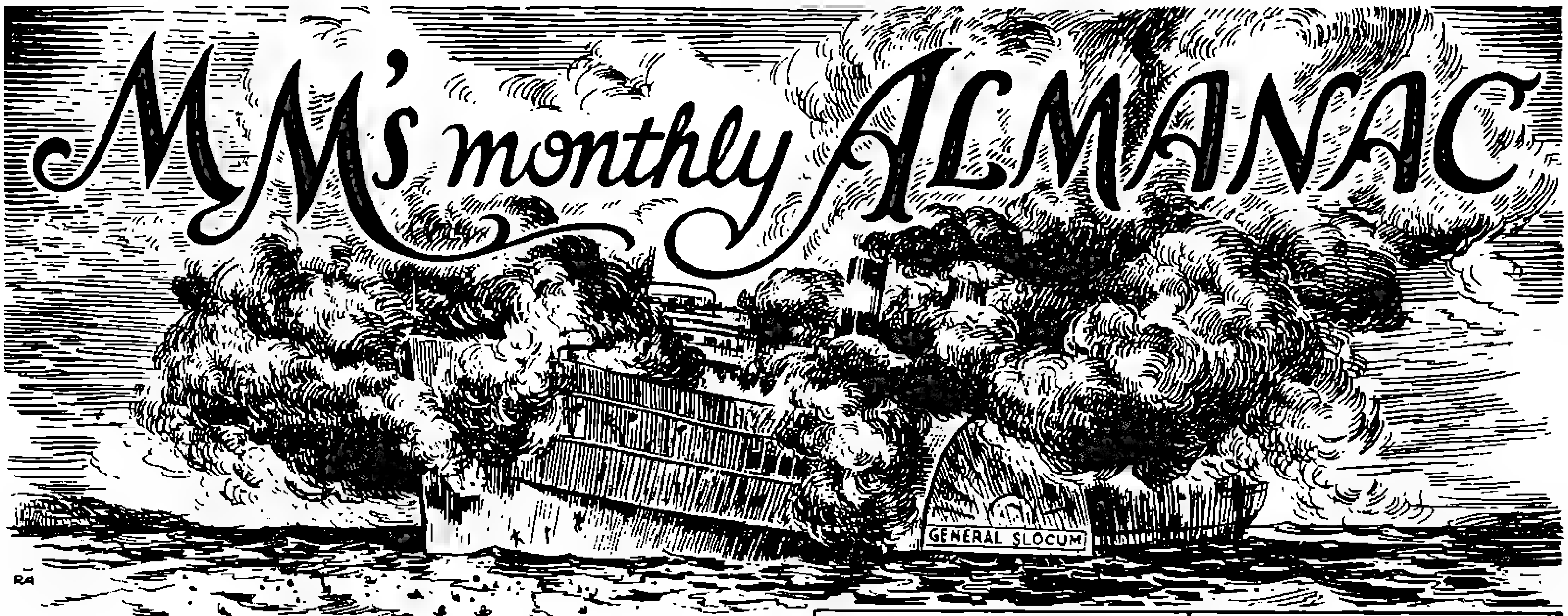
Radial "wiping" device for the cine amateur eliminates abruptness between scenes by partially dissolving latter frames of one scene on the first part of succeeding scene.

Sails Add Zest to Surfboarding

RIDING surfboards equipped with sails is the latest innovation in the realm of American water sport.

Until recently no outdoor enthusiast is believed to have thought about converting Hawaii's age-old surfboards and outrigger canoes into wind-propelled crafts. The new idea has made an instant hit at many of the beaches and resort centers.

MM's monthly ALMANAC

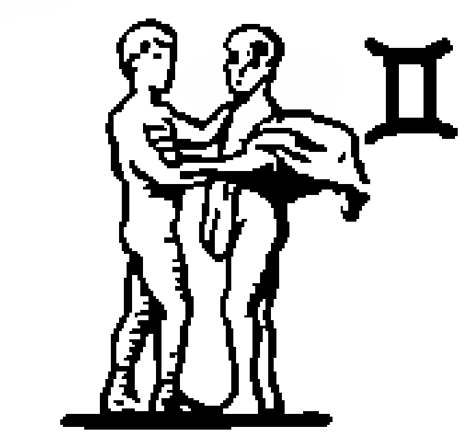

GENERAL SLOCUM

June 15, 1904, one of the greatest marine disasters in history occurred. The excursion steamship *General Slocum* caught fire going through Hell Gate, New York City, and, of 1,400 persons on board, 1,021 lost their lives. Other major marine disasters of the month: June 5, 1916, British cruiser *Hampshire* was sunk by a German mine in Orkney's, Scotland; Earl Kitchener, British Secretary of War, and several hundred others were lost. June 25, 1894, the steamship *Norge* was wrecked on Rockall Reef in the North Atlantic and 600 lives were lost. June 28, 1904, 646 persons were lost when the steamer *Norge* was wrecked.

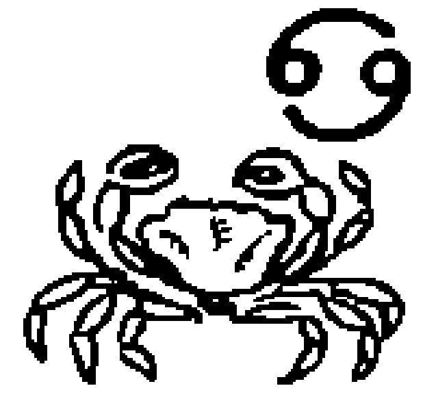
The MOON'S PHASES

	Day (June)	Time (E.S.T.)
🌑	1	2:52 a. m.
🌓	9	12:49 a. m.
🌕	16	3:20 p. m.
🌗	23	9:21 a. m.
🌑	30	2:44 p. m.

SIGNS of the ZODIAC



GEMINI—THE TWINS



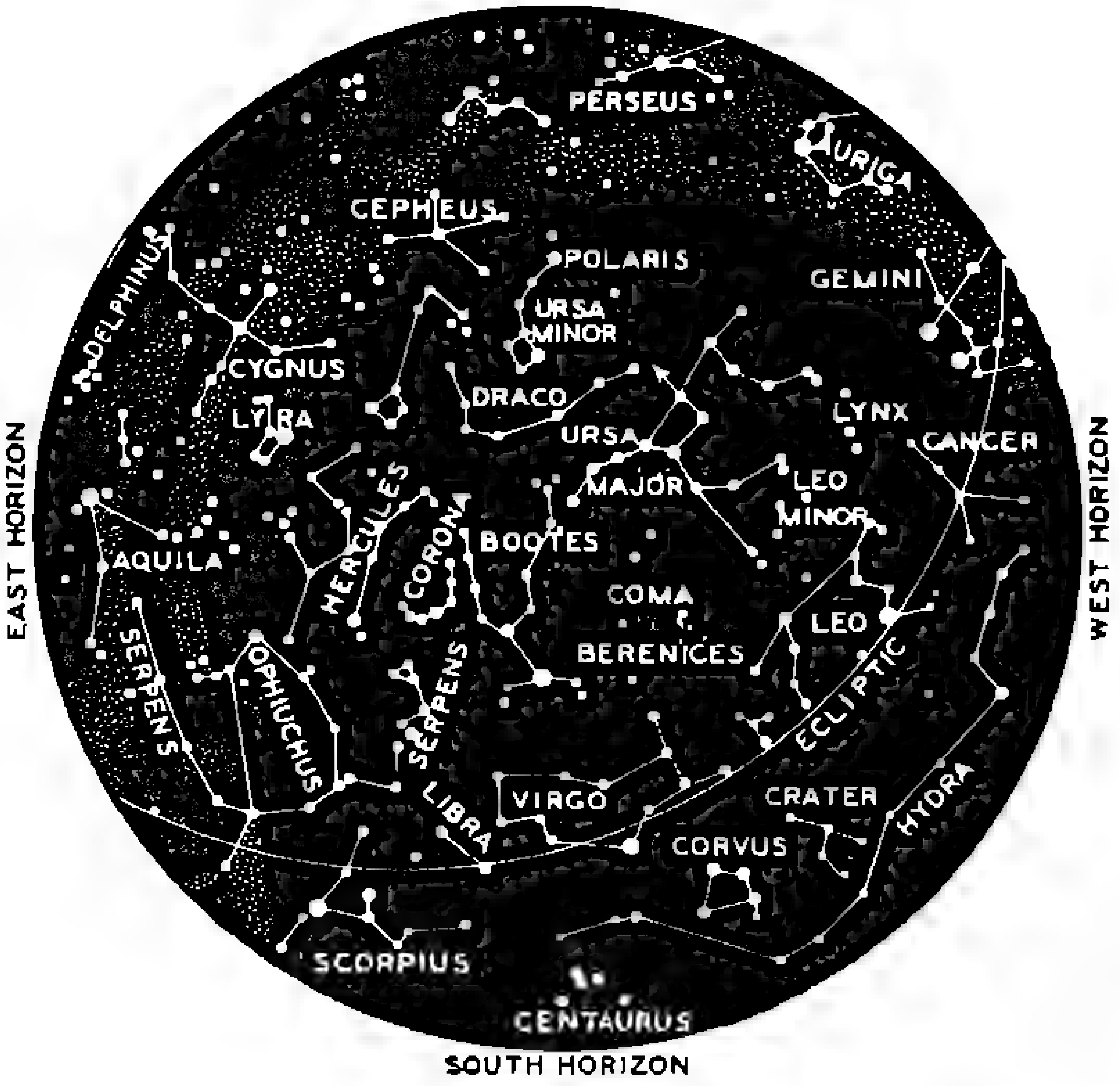
CANCER—THE CRAB

JUNE

2—The principle of the telephone was discovered by Alexander Bell, 1875. The first telephone conversation was held on March 7, 1876.

8—An Act of Congress, authorizing the penny postcard, was approved, 1872.

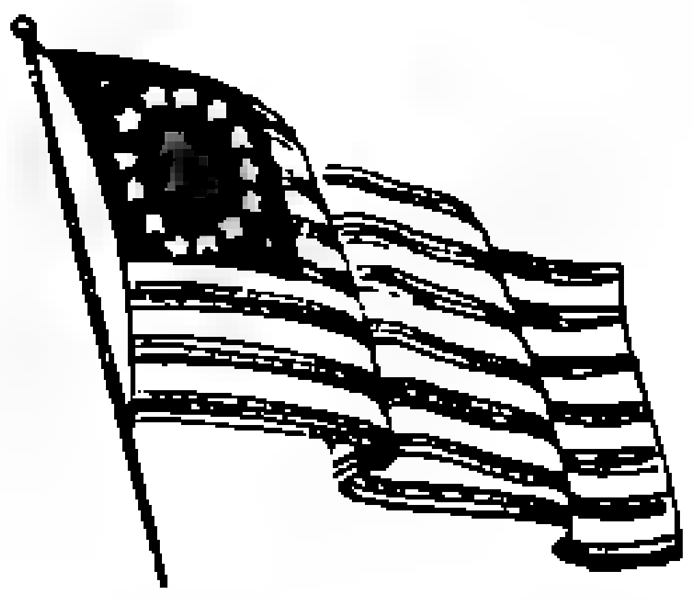
MAP of STARS in JUNE


NORTH HORIZON
PERSEUS
AURIGA
CEPHEUS
POLARIS
GEMINI
DELPHINUS
URSA MINOR
CYGNUS
LYRA
DRACO
LYNX
CANCER
URSA MAJOR
LEO MINOR
EAST HORIZON
HERCULES
CORONA
BOOTES
AQUILA
COMA BERENICES
LEO
WEST HORIZON
SERPENS
OPHIUCHUS
SERPENS
ECLIPTIC
LIBRA
VIRGO
CRATER
HYDRA
CORVUS
SCORPIUS
CENTAURUS
SOUTH HORIZON

To use map, face south with south horizon at bottom. Map shows sky at 9 p. m. on June first or 8 p. m. on June fifteenth.

9—The second largest meteorite of which date of fall is known fell at Knyahinya, Hungary, 1866. It weighed 647 pounds.

14—Congress adopted the Stars and Stripes as the flag of the United States, 1777.



15 — John Alcock and A. W. Brown made the first non-stop airplane flight across the Atlantic from Newfoundland to Ireland, 1919.

18—U.S.S. *Savannah,* the first ship to use steam in crossing the ocean, arrived in Liverpool after a 26-day crossing from Savannah, Ga., 1819.

21—The summer solstice and longest day of the year. On this day the sun does not set on United States territory for 24 hours.

23—Christopher Latham Sholes was granted a patent on the first practical typewriter, 1868. Wiley Post and Harold Gatty took off in 1931 in the monoplane *Winnie Mae* to fly 15,474 miles around the world in the record time of 8 days, 15 hours, 51 minutes.

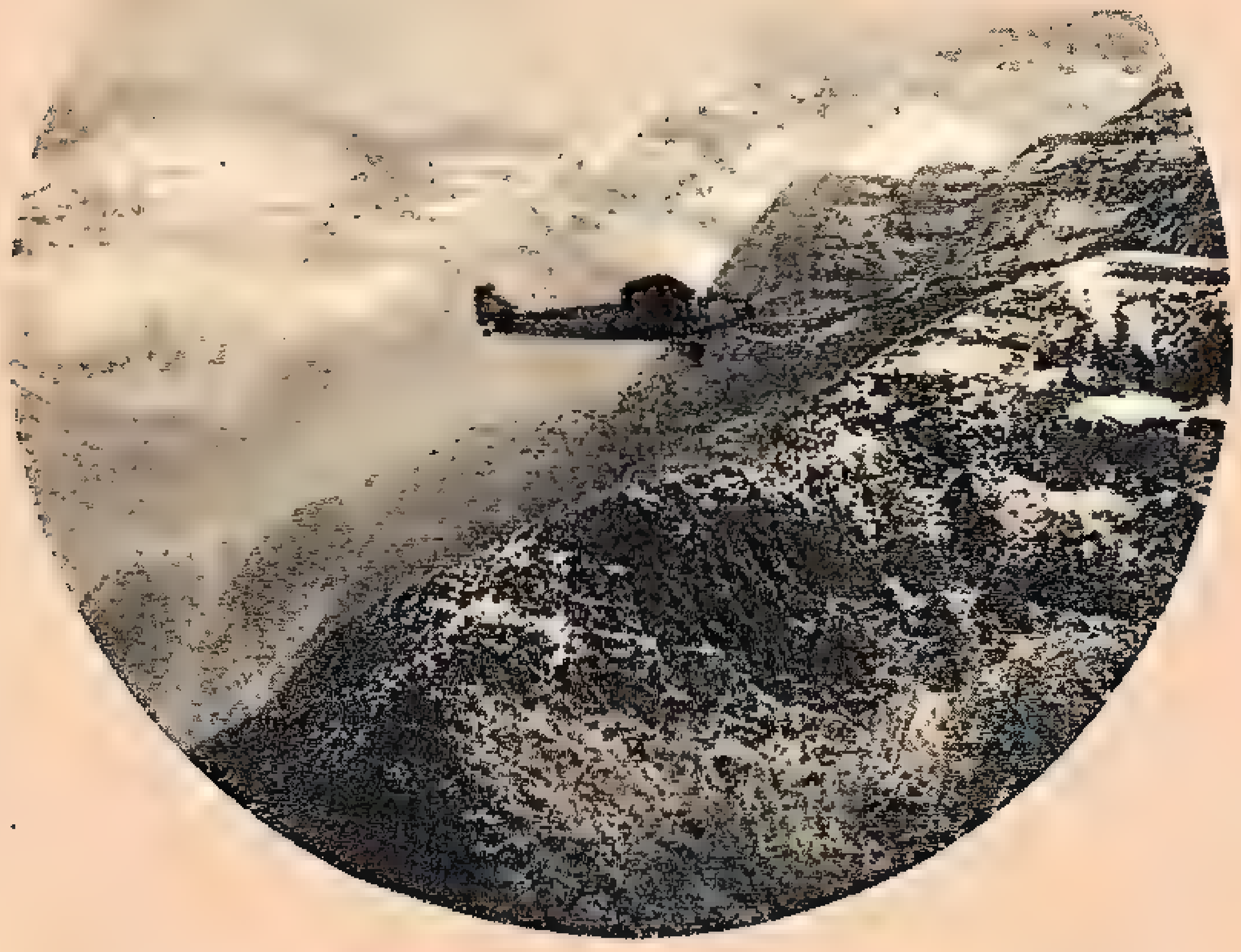
30—There will be a 34 per cent eclipse of the sun, 1935, visible in Europe, but not in the U. S. It will begin at 6:34 p. m. Greenwich Civil Time, and last 3 hours, 51 minutes.

Who Will Win HISTORY'S

In this exclusive interview the President's son tells of his plans for a $100,000 speed classic around the Americas.

Will the brute power of some monster transport win $50,000? This is a new United Air Lines transport.

Elliott Roosevelt, son of the President, announces the greatest international air contest in history—a free-for-all race around North and South America for the world's crack speed pilots.



Roughest hop on 20,000 mile air race course is this, the Andes crossing between Buenos Aires and Santiago. A minimum altitude of 18,000 feet must be maintained for 110 miles. Photo shows a Pan-American Airways plane above the Andes, where treacherous air currents ever threaten.

by JAMES DYSON

A GIGANTIC "Around the Americas" air race, with practically every famous distance flyer in the world entered, is now being planned by 23-year-old Elliott Roosevelt, son of the President. October of this year or April, 1936 are the contemplated starting dates for this contest over the longest course in history, almost 20,000 miles, with prize money exceeding $100,000.

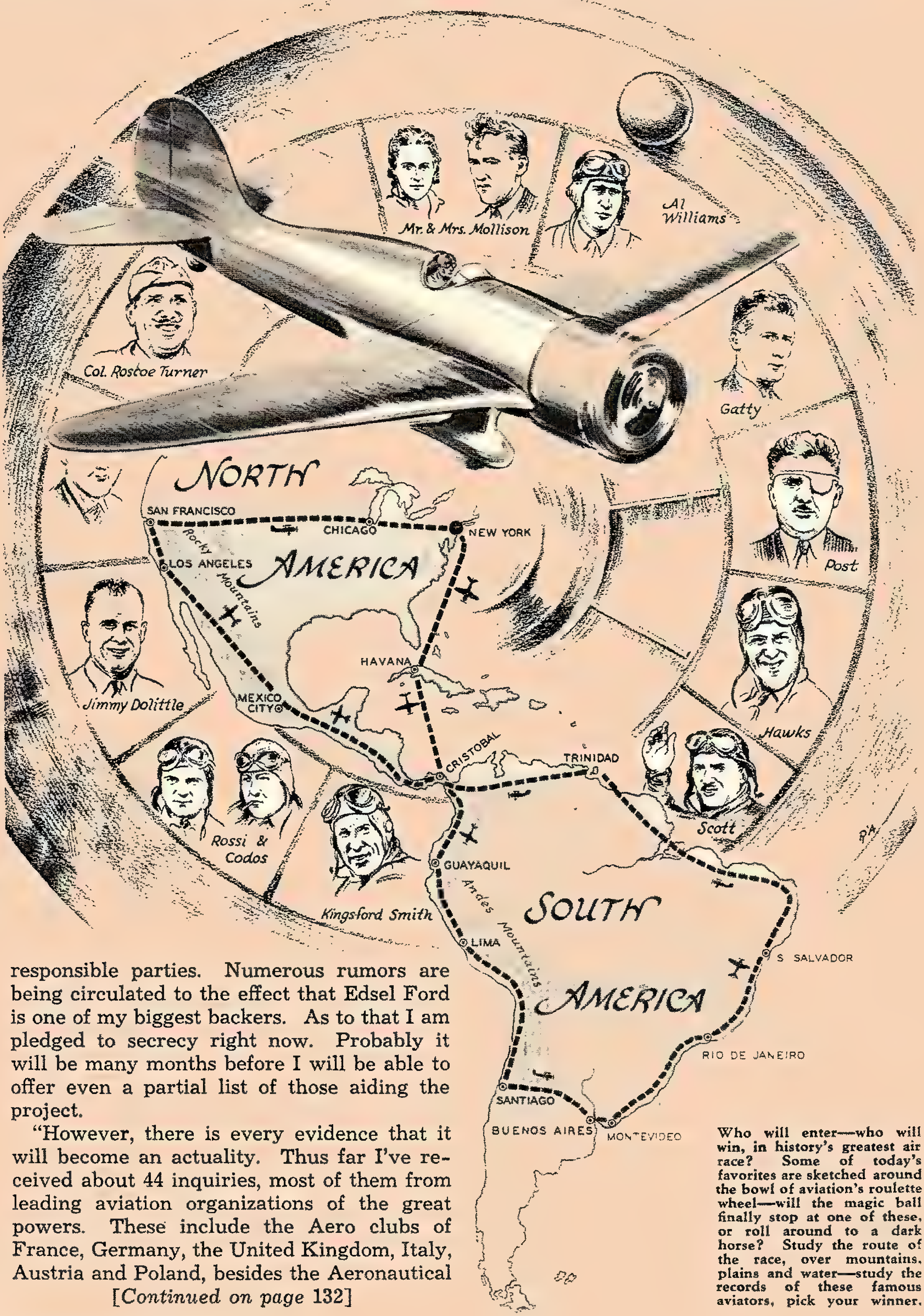
This race will be the most trying test of an airplane ever attempted, announces the National Aeronautic Association, official governing body for all American air records. All kinds of conditions will be met from extreme cold to extreme heat. An altitude of at least 18,000 feet will be encountered in crossing the Andes between Buenos Aires on the Atlantic and Santiago on the Pacific. Water jumps, deserts and jungles must be negotiated by the successful contender.

As Ray Cooper, general manager of the N. A. A. points out: "The longest water hop is about 700 miles. The roughest part of the trip is across the Andes from Mendoza to Santiago, but the distance is only 110 miles. If the course is maintained the pilot should be able to walk away from a forced landing in any other place, and with a reasonable supply of emergency rations should be able to exist until rescued."

Interviewed exclusively for MODERN MECHANIX AND INVENTIONS MAGAZINE in the historic Red Room of the White House, Elliott Roosevelt recently discussed the highlights of his plans as follows:

"Will I be able to swing the great international race? Without doubt a lot of veteran flyers are skeptical. But already I have raised most of the prize money and now have ample promises of adequate financing from

GREATEST Air RACE?


Mr. & Mrs. Mollison
Al Williams
Col. Roscoe Turner
Gatty
Post
Hawks
Scott
Kingsford Smith
Rossi & Codos
Jimmy Dolittle
NORTH AMERICA
SAN FRANCISCO
CHICAGO
NEW YORK
LOS ANGELES
Rocky Mountains
HAVANA
MEXICO CITY
CRISTOBAL
TRINIDAD
GUAYAQUIL
Andes Mountains
LIMA
SOUTH AMERICA
S. SALVADOR
RIO DE JANEIRO
SANTIAGO
BUENOS AIRES
MONTEVIDEO

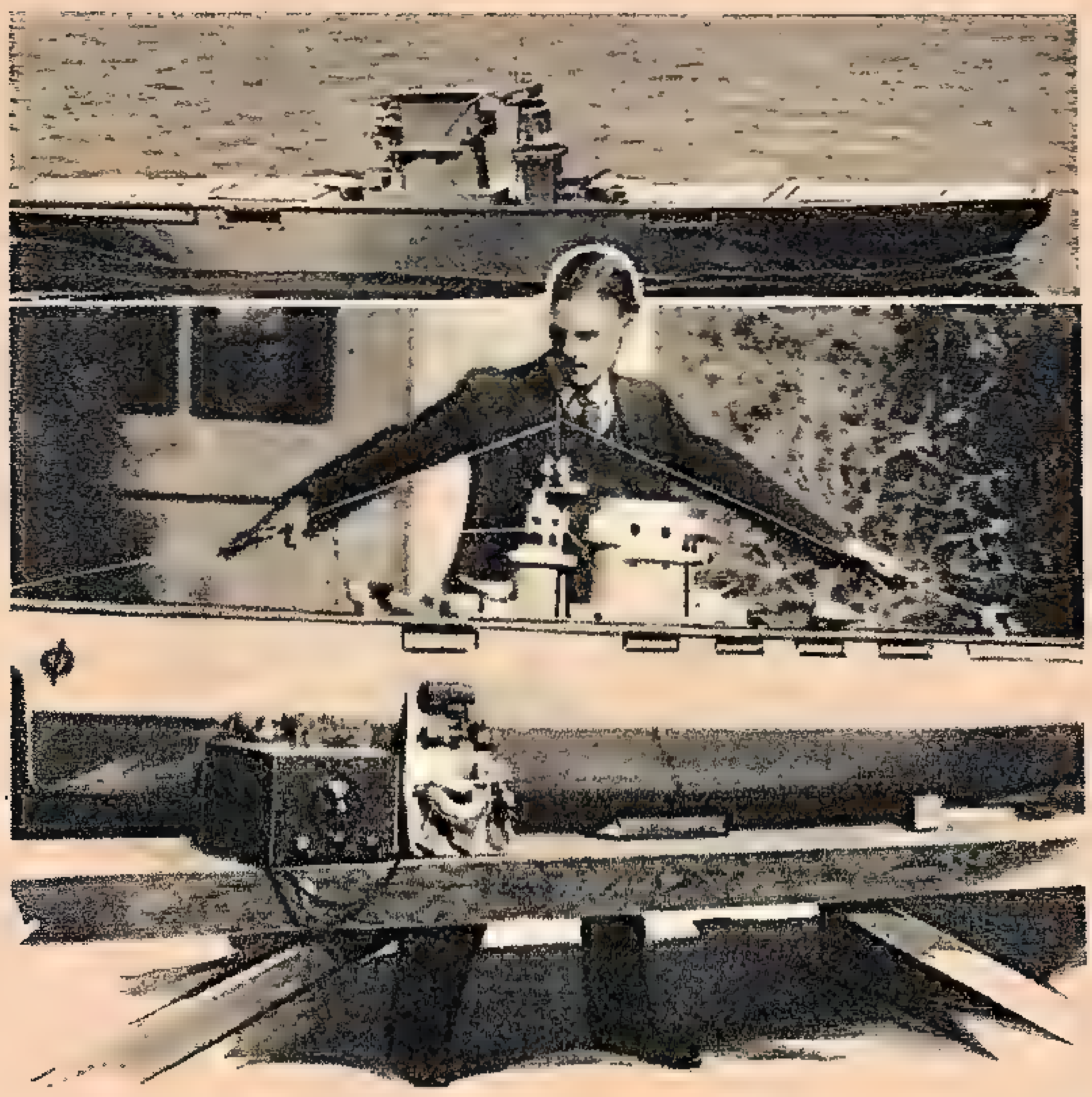
responsible parties. Numerous rumors are being circulated to the effect that Edsel Ford is one of my biggest backers. As to that I am pledged to secrecy right now. Probably it will be many months before I will be able to offer even a partial list of those aiding the project.

"However, there is every evidence that it will become an actuality. Thus far I've received about 44 inquiries, most of them from leading aviation organizations of the great powers. These include the Aero clubs of France, Germany, the United Kingdom, Italy, Austria and Poland, besides the Aeronautical

[*Continued on page* 132]

Who will enter—who will win, in history's greatest air race? Some of today's favorites are sketched around the bowl of aviation's roulette wheel—will the magic ball finally stop at one of these, or roll around to a dark horse? Study the route of the race, over mountains, plains and water—study the records of these famous aviators, pick your winner.

Model Airplane Carrier Controlled Mile from Base By Radio



Top—Model of S. S. Saratoga. Photoelectric cell in smoke stack controls boat in calm water. Lower photo shows relative size of copper plated ship which took 300 hours to build.

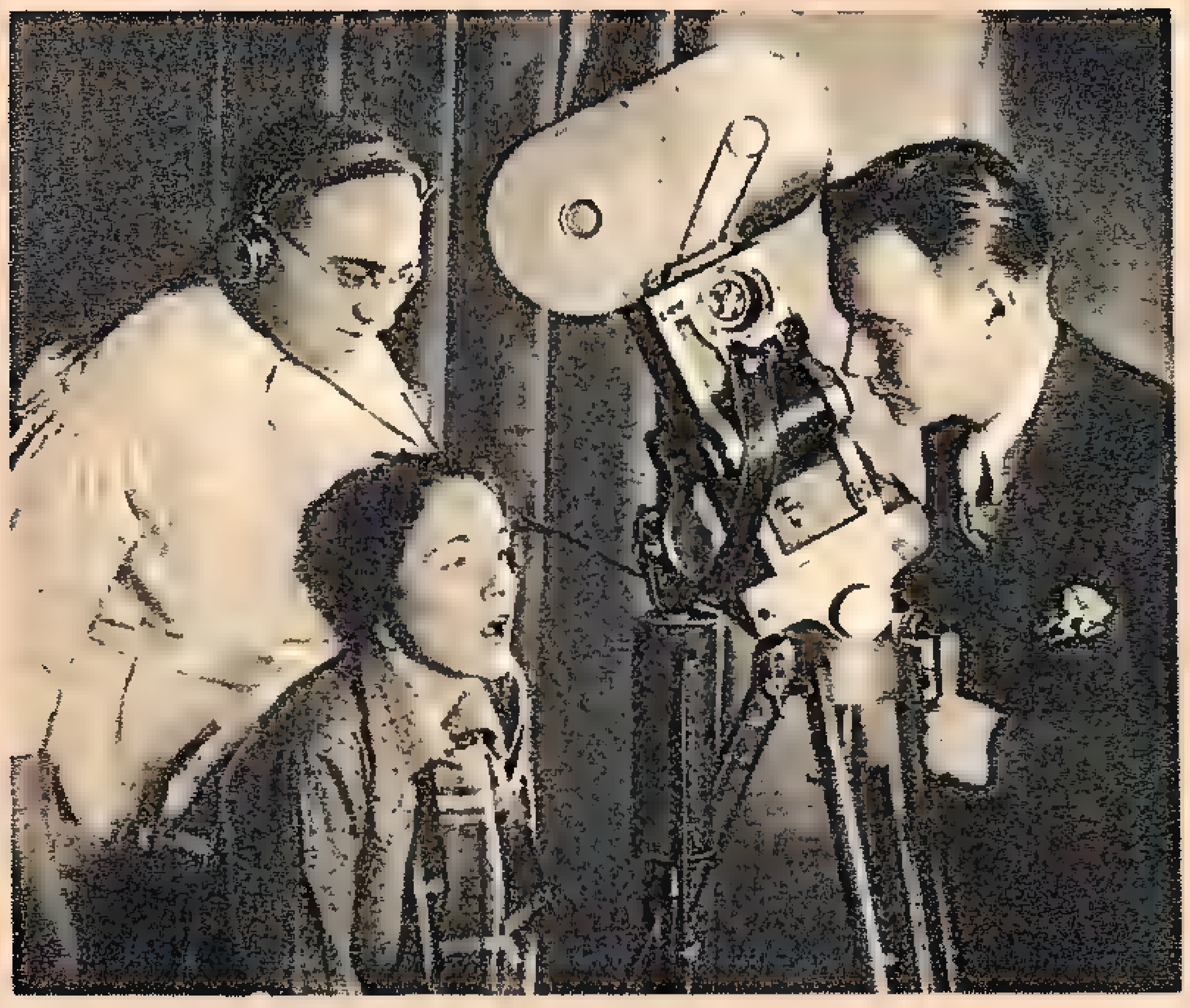
A RADIO-CONTROLLED model of the airplane carrier, S. S. Saratoga, was recently constructed by H. E. Bixby, secretary of the Los Angeles Society of Model Engineers.

Almost mechanically perfect, the nine-foot model houses two storage batteries for power. A receiver operates a delayed relay to control the arc of the rudder and the two speeds forward as well as the one in reverse. In quiet water the ship can be controlled by a light beam directed to an electric eye attached to the smoke stack. Three hundred hours were required to build the $450 model. It weighs 350 pounds.

"Talkies" Help Fit False Teeth

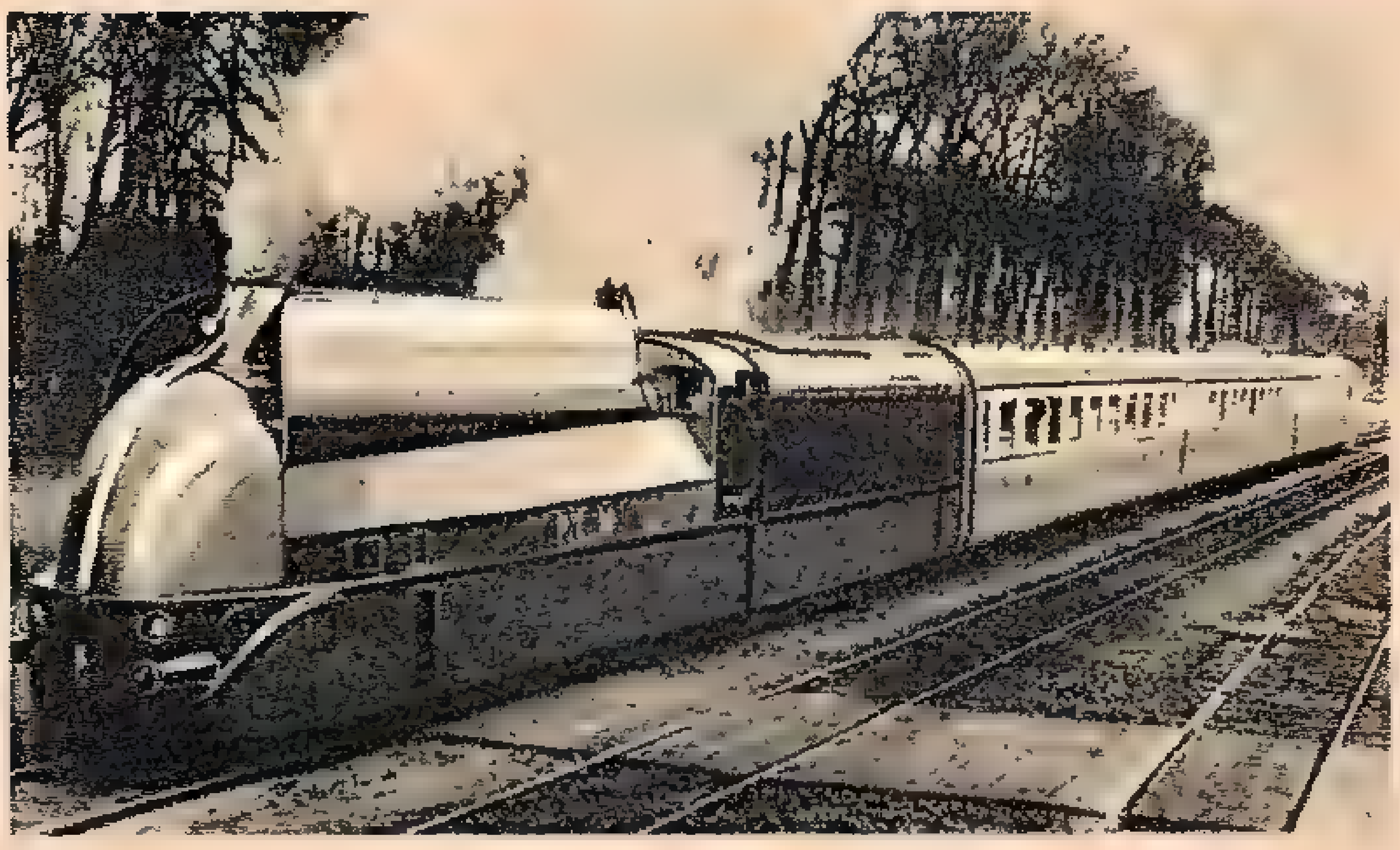
TO INSURE his patients of non-clicking, non-whistling false teeth, an eastern dentist films his subjects with a sound camera and projects the finished film as a final test for a perfect fit.

Each patient is filmed when he visits the office for the first time. He smiles broadly and repeats, "pussy, pussy, come and eat your celery soup." After the new dentures are placed in the mouth, the patient is again photographed. Comparison of the films reveals defects in speech of teeth.



Dr. Ralph Levine, (left) Pittsburgh dentist, demonstrates the usefulness of the sound camera in fitting teeth. Facial expression, clicking and whistling can be studied this way.

French Train Has Low Headlights

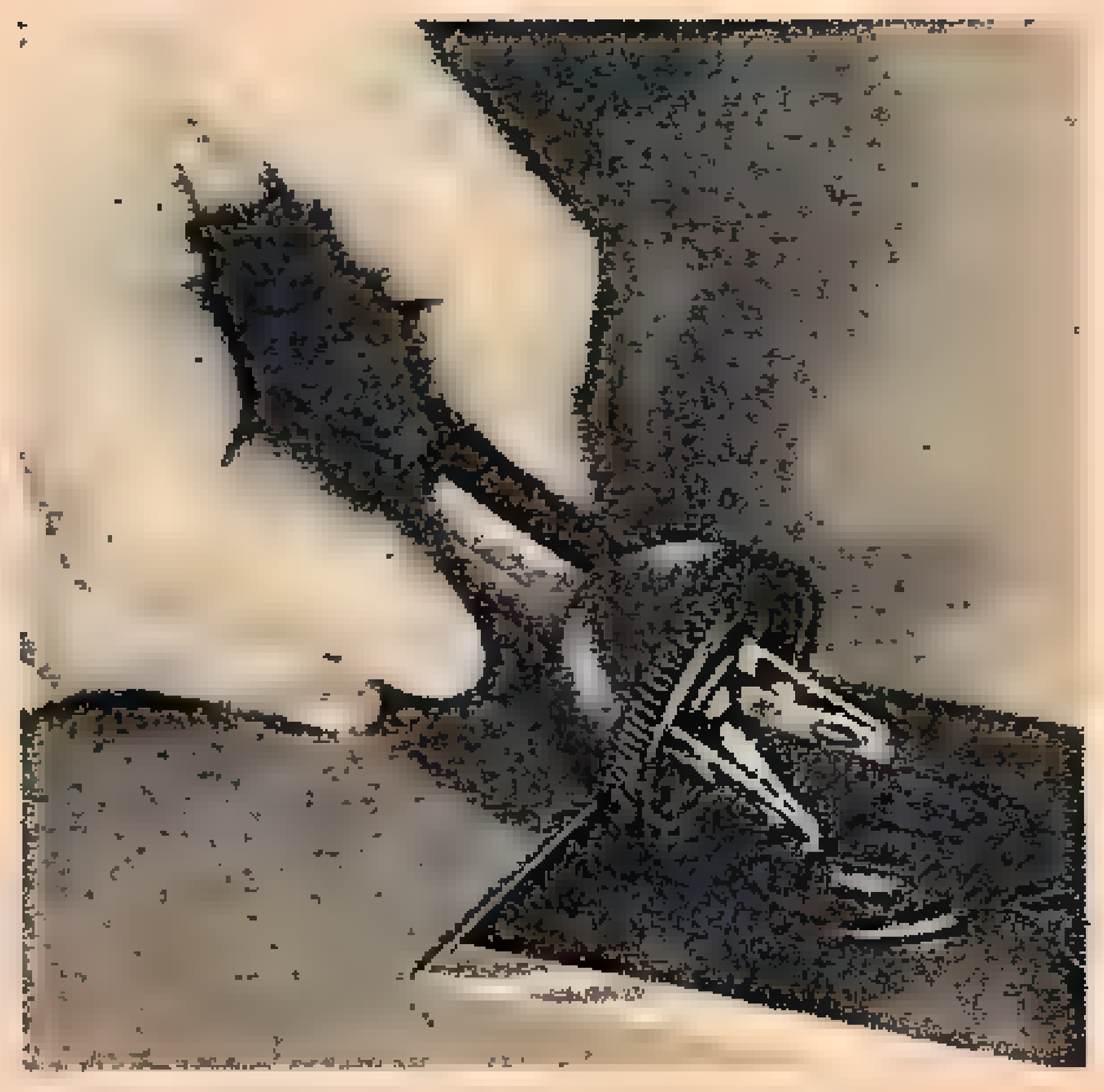


France has decided to follow America's example of streamlining locomotives. Note the odd placement of headlights.

THE modern trend in streamlining has at last been felt by French locomotive designers who now are introducing striking, bullet-shaped trains of their own. Operating on the latest aerodynamic principles, the train seen above averaged nearly a mile a minute. The headlights, unlike older types, are placed low to cast beams just above the rails.

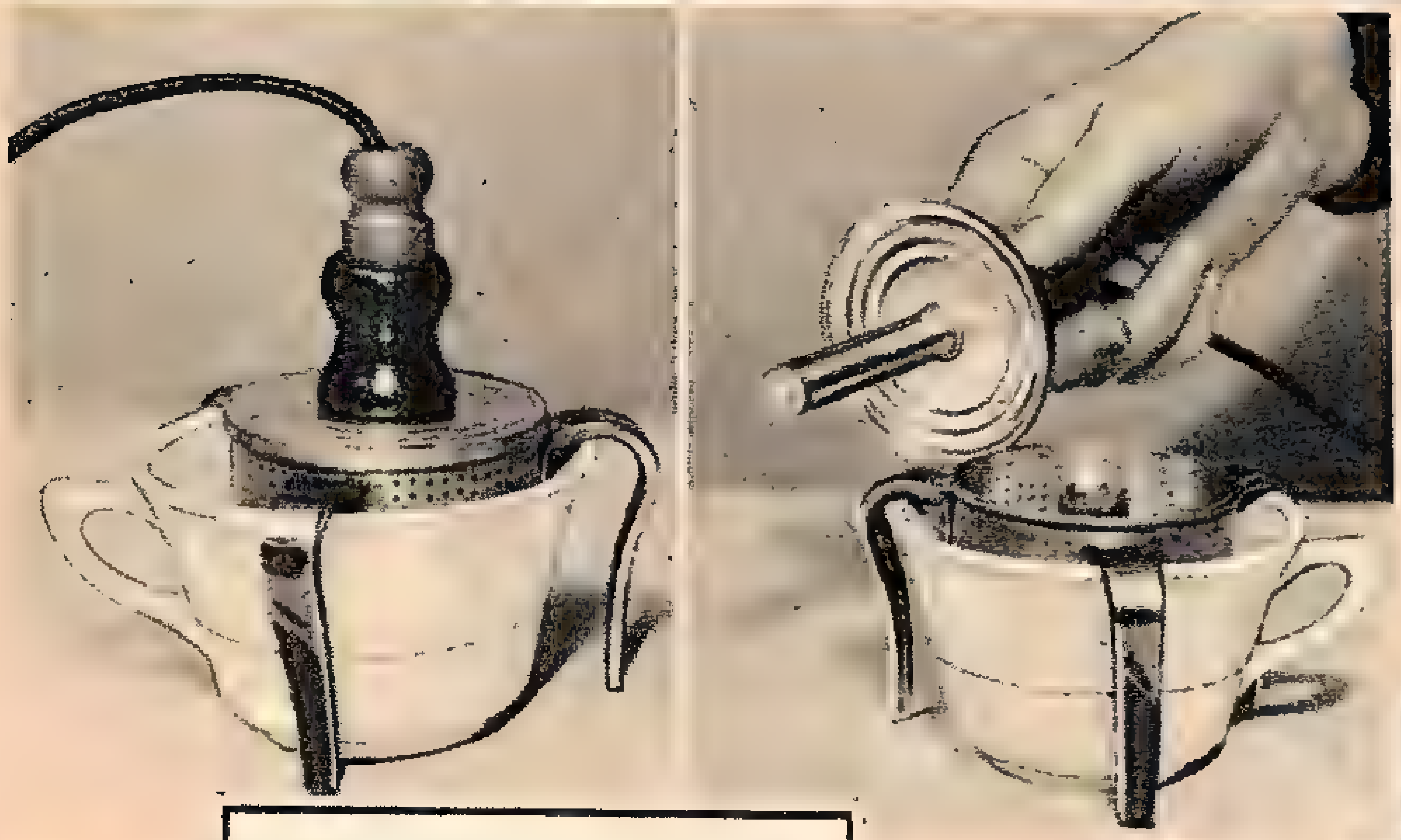
New Plugs "Stay Put" In Outlet

SPRING action electrical plugs which are claimed to "stay put" in wall outlet or socket and insure perfect contact eliminate the danger and annoyance of loose-fitting plugs. New prongs also may be had.



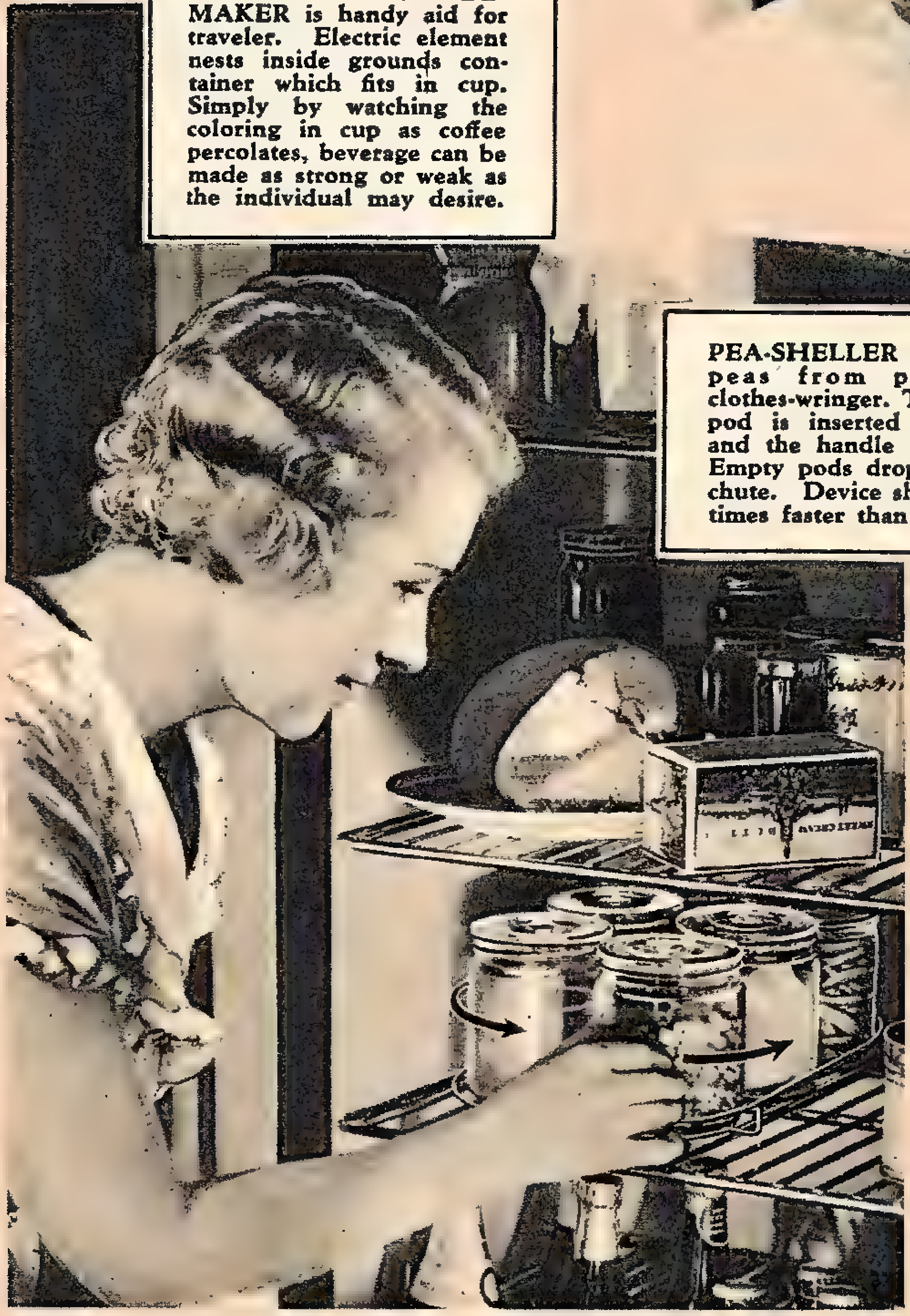
This spring action plug is said to fit tightly in outlet when inserted. Shape of the prongs insures perfect contact and prevents arcing.

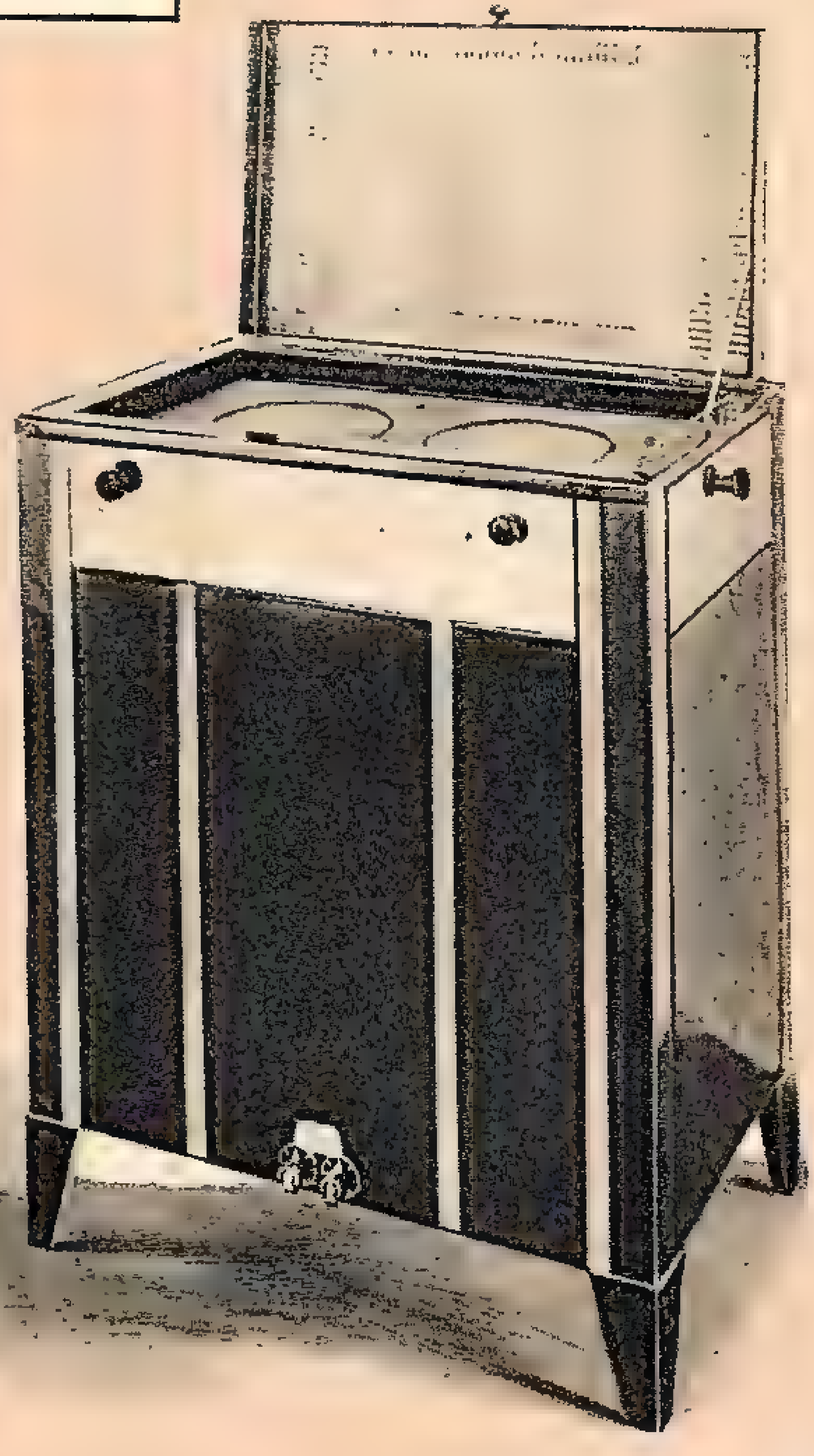
PEA SHELLER, ONE CUP COFFEE Maker EASE HOUSEWIFE'S KITCHEN TASKS



ONE-CUP COFFEE-MAKER is handy aid for traveler. Electric element nests inside grounds container which fits in cup. Simply by watching the coloring in cup as coffee percolates, beverage can be made as strong or weak as the individual may desire.

PEA-SHELLER squeezes peas from pod like clothes-wringer. The whole pod is inserted near top and the handle is turned. Empty pods drop out one chute. Device shells eight times faster than by hand.





Above—FOOD JAR TRAY for cooler is space-saver and eliminates reaching into refrigerator. Glass jars placed in wire tray may be revolved to front by pushing forward jar to rear. Right—OIL-BURNING HEATER, designed for small homes and apartments which have no furnaces, is converted into cook stove by lifting lid and cooking over top surface of heater.

TEACH Your DOG

A famous dog trainer tells how to teach your dog to back up, shake hands, pray, act dead, carry articles, sneeze, waltz, and do a host of other interesting tricks.

Through the hoop, held shoulder high, leaps this well-trained dog. Make your dog jump over a horizontal bar first, then through a large hoop, reducing hoop size as he gains confidence. Later, paste tissue paper on hoops.

TRAINING your dog is not as difficult a task as some may assume. Patience, kindness and good care will bring rich rewards in the form of increased loyalty, prompt obedience to commands; and good manners.

Dogs are like humans when it comes to performing tricks they have thoroughly mastered. Their sense of pride is apparent when they are the center of attraction, the life of the party.

Perhaps the simplest of tricks is teaching a dog to shake hands. Place the dog in a sitting position. Standing directly in front of him, grasp the right paw gently, raise and shake it, saying "shake hands." A few minutes of this lesson daily for a day or two will make your dog eager to shake hands whenever he gets the chance.

Commands which are properly taught will always be obeyed. Show a rubber ball to him, then drop it on the floor, commanding "pick it up." This done, coax him to you, command "drop it," then repeat the trick.

After having learned to pick up a ball, the dog may be taught to hold it. Take his collar in your right hand and with the left, support his lower jaw, cautioning him all the time to "hold it." Reward him and repeat the lesson. When he becomes proficient in holding, tell him to "come, carry it," and start walking. Be sure he does not drop it. Do not

A few minutes of training each day will make your dog sit up or fetch articles at your command.

THESE TRICKS

by EARL CRAIG

Dogs enjoy jumping over sticks once they are taught, by a few gentle raps on the nose, not to grab the stick or run under. Right: One of the more difficult stunts, but one which can be taught by patience, is waltzing while standing.

At the command "dead dog," the dog below lies down, feet in air, eyes closed. In teaching a dog to "roll over," push him around a few times yourself, while repeating command.

make the distance too long to begin with.

The old saying, "practice makes perfect," was never truer than when applied to teaching the dog. A short training period, frequently and consistently given, is the best routine to follow.

Each year many dogs are accidentally and intentionally poisoned. Two methods are used in teaching the dog to ignore choice looking bones or meat left about in conspicuous places. First watch him closely. When you see him about to pick up something, say, "No, poison, drop," and enforce your command. It may be necessary to plant some bait at a point he frequently passes, but do not let him see you place the bait.

The second method is much more effective though not a pleasant one for the dog. Have your druggist prepare some bitter but harmless preparation for you. Tell him what you want to use it for. Pour it on some choice and tempting pieces of meat, and place them in different locations. Take the dog for a walk and casually pass your bait. When you see him pick it up, caution "poison," but say no more. Likely as not when your back is turned, he will gulp it down and follow you. Keep him outside, for aside from the bitter taste left in his mouth it is quite likely the preparation will make him sick. A little red pepper or other strong seasoning, concealed in meat, is also used by dog owners for this purpose. Usually, after one or two lessons, he will refuse to eat anything lying around the yard.

Dogs seem to acquire the knack of doing tricks in a very short time, once they have been taught control and prompt obedience

[*Continued on page* 135]

Figures Prove You Lose $300 If Letter Chain Is Unbroken

IF YOU HAVE RECEIVED YOUR CHAIN LETTER
FREE

Merchant, owning store above, gave away free printed forms for chain letters. In the dime chain, if each of 15,625 persons, necessary to complete first link, carried out the agreement of the letter and also received $1,562.50 apiece, 244,140,625 persons would have to mail dimes. For carrying mail government would get $9,155,273.55 in postage.

"YOU can't lose," said the chain letter fans, but Dr. C. R. Fountain, of Peabody College, Nashville, Tenn., estimated that everyone would lose at least $300. Each one in the dime chain expected to receive more than 15,000 dimes.

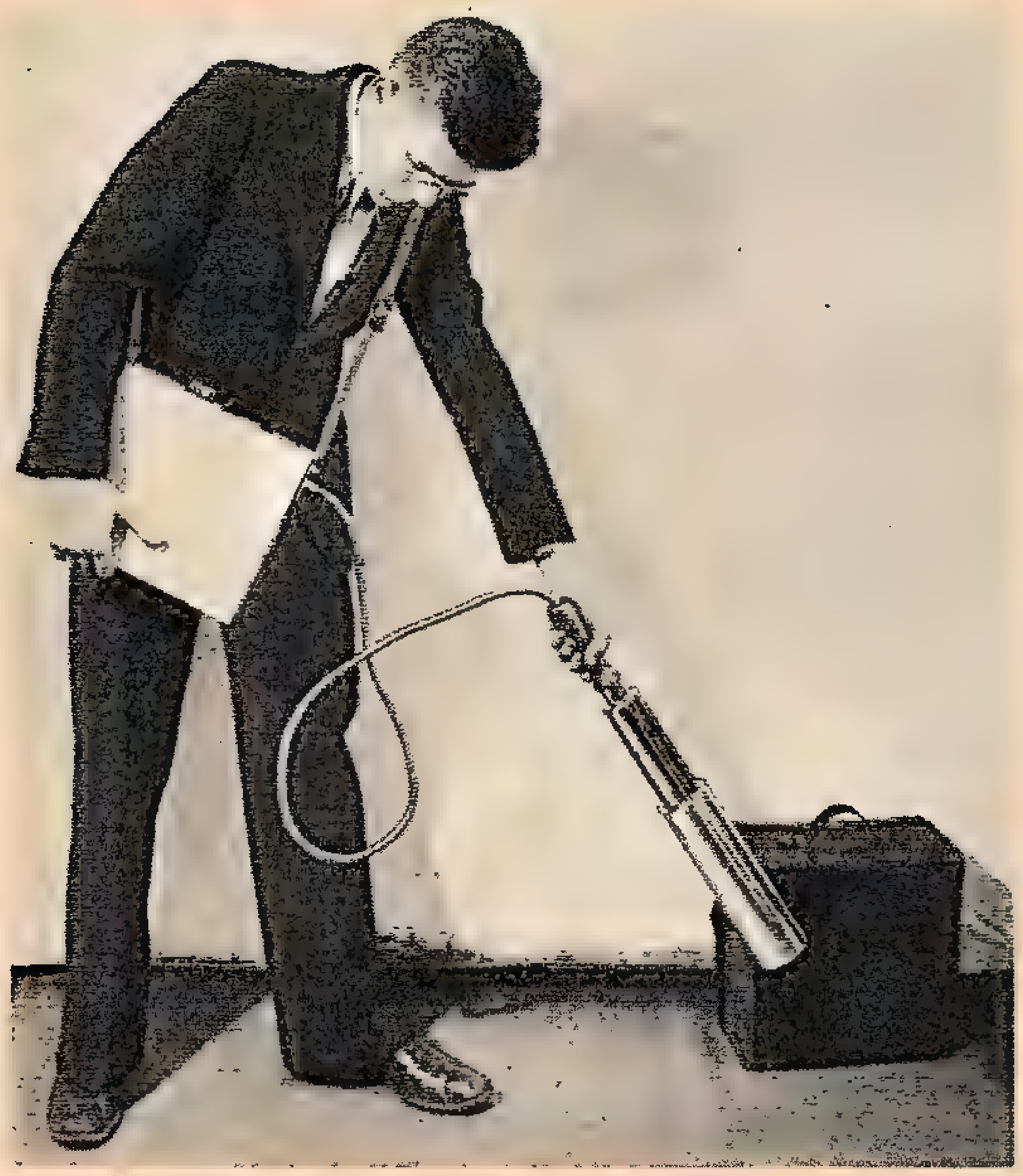
"In order to bring that about," Dr. Fountain was quoted as saying, "the chain would have to keep spreading until it reaches everyone 15,000 times, when each person will have to give back all the dimes he takes in. Then we will all be back where we started—only each one will be out the amount he spends on postage, or about $300."

In the case of the one dollar chain, in which a person receiving the letter had to get a dollar bill from two friends, mathematicians calculated that when the chain had reached its thirty-third stage in passing from one person to two others, to four others, and so on, a total of $17,179,926,032 would be in the purses of chain letter fans. This sum is approximately $3,000,000,000 more than the total amount of money actually existing in the United States. Chains up to $25 were started throughout the country.

Portable Rod Finds Lost Radium

LOST radium may be located quickly by a new portable instrument designed to replace the old electroscope method.

The device consists of a box and exploring rod connected with a flexible cable. The rod houses a special vacuum tube while the box contains batteries, switches, controls and a second amplifier tube. When the rod is passed slowly over the ground, the instrument needle indicates the presence of lost radium. It will detect as little as 25 milligrams at 7½ feet.



The old electroscope method of locating lost radium is being replaced by the portable outfit above. Instrument needle in box is deflected when the rod finds the precious metal.

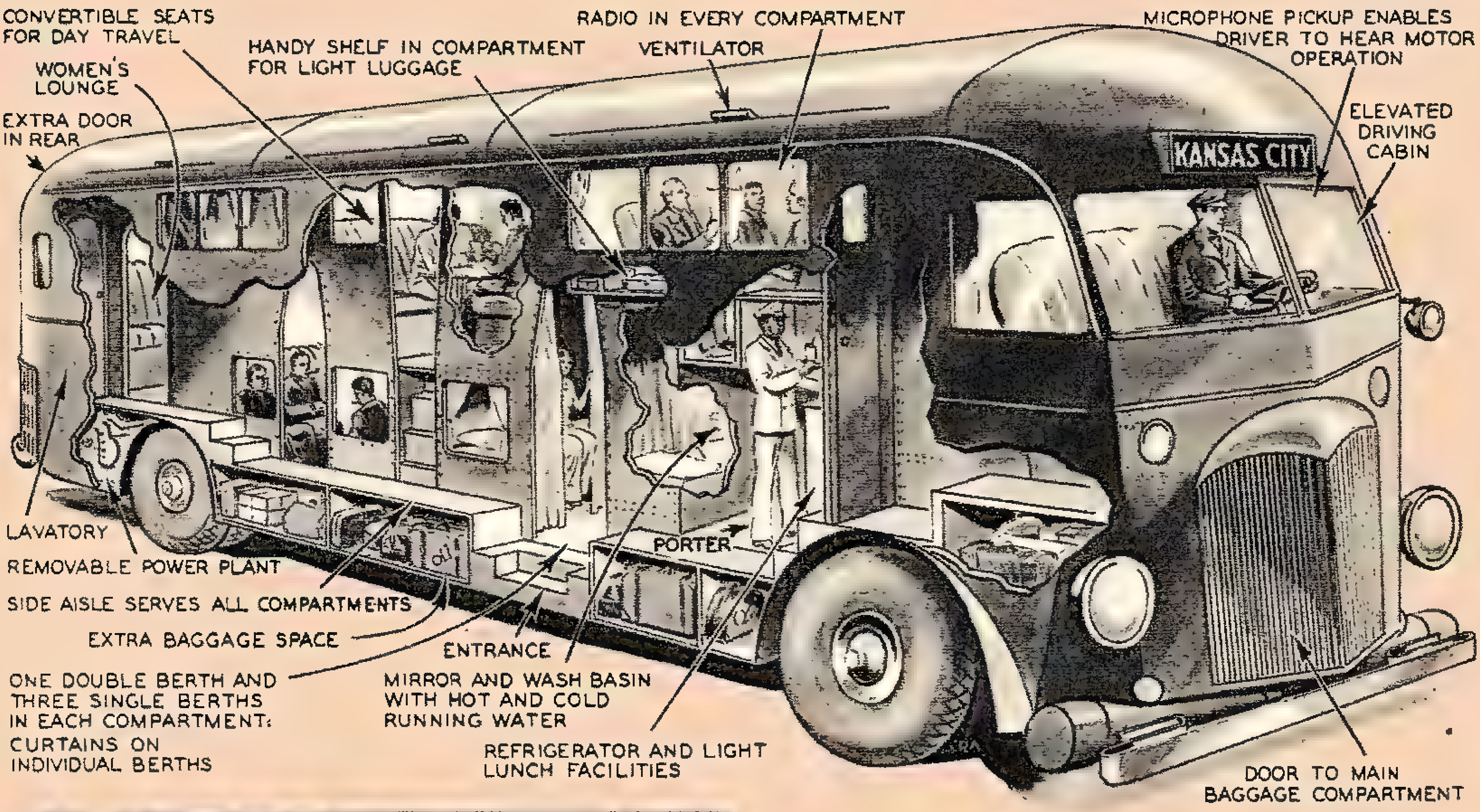
Steam Train Challenges Diesel

As a challenge to streamlined Diesel-motor locomotives, this new two-mile-a-minute steam monster was recently put into service on the regular run between Chicago and St. Paul.

BELIEVED to be the fastest streamlined steam locomotive in the world, the newly-christened "Hiawatha" has thundered its bid for rail supremacy in answer to Diesel-powered competition (see page 45).

The new steam monster, capable of attaining a speed of 120 m.p.h., has been introduced into service by the Milwaukee Road on the run between Chicago and St. Paul.

Deluxe NIGHT BUS Has Private Berths


CONVERTIBLE SEATS FOR DAY TRAVEL
WOMEN'S LOUNGE
EXTRA DOOR IN REAR
HANDY SHELF IN COMPARTMENT FOR LIGHT LUGGAGE
RADIO IN EVERY COMPARTMENT
VENTILATOR
MICROPHONE PICKUP ENABLES DRIVER TO HEAR MOTOR OPERATION
ELEVATED DRIVING CABIN
KANSAS CITY
LAVATORY
REMOVABLE POWER PLANT
SIDE AISLE SERVES ALL COMPARTMENTS
EXTRA BAGGAGE SPACE
PORTER
ENTRANCE
ONE DOUBLE BERTH AND THREE SINGLE BERTHS IN EACH COMPARTMENT; CURTAINS ON INDIVIDUAL BERTHS
MIRROR AND WASH BASIN WITH HOT AND COLD RUNNING WATER
REFRIGERATOR AND LIGHT LUNCH FACILITIES
DOOR TO MAIN BAGGAGE COMPARTMENT

Deluxe night-traveling comforts found in Greyhound's new sleeper-buses now operating between Los Angeles and Kansas City. Phantom drawing shows construction of night-coach. Above—Corner of women's lounge. Right—One of five spacious compartments in 25-passenger bus.

AMERICA'S first daily cross-country sleeper-bus, a luxury home on tires, recently ushered in "nite-coach" service between Los Angeles and Kansas City. Designed to make long-distance travel more enjoyable for the passenger, the new Greyhound bus boasts many features.

Berths for 25 persons are found in each of the fleet of coaches. There are five compartments equipped with radio, mirror, hot and cold running water and a portable table.

Entrance to the bus is made at the right center, but unlike yesterday's vehicle, an aisle running the entire length of the coach is provided along one side. Each compartment contains a large double berth and three singles, convertible into cushion lounge seats for day travel. There is sufficient room to permit dressing while standing up.

The walls of the bus are insulated against radical weather changes while a special ventilation and heating system maintains constant temperature. To eliminate noises, the power plant is located at the rear and can be removed and replaced in twenty minutes. Behind the false radiator front are spacious quarters for storing luggage.

UNCLE SAM FIGHTS

by JAMES NEVIN MILLER

LIKE a forest fire roaring out of control, a huge billowy cloud sweeps over the horizon. Growing larger and larger, it soon blots out the sun. Day turns into night. For miles around, the air is filled with stifling, blinding dust. Fine particles strike the face like millions of white-hot needles. The dust stabs at one's lungs.

Within an hour, the black blizzard has enveloped everything. Living becomes unbearable. Schools close their doors. Trains drop far behind schedule, their powerful headlights unable to pierce the black dust cloud. Discouraged farmers, fearful of dread "dust pneumonia," pack their belongings into wagons and move away. The dusty drifts cover fences and farm machinery and sweep over buildings.

Crops are destroyed. The valuable top soil is gone. For months, cattle will be unable to forage on the surrounding hillsides.

Do these black blizzards foreshadow the doom of the fertile United States? Dr. William Jackson Humphreys, of the United States weather bureau at Washington, recently predicted that by 7,000 A. D. the United States and most of Asia and Europe will become a desert due to lack of rainfall. Weather in the temperate zone is gradually becoming warmer. The time will come, Dr. Humphreys believes, when the populations of the world will be forced to flee to the tropics or polar regions to find sufficient rainfall to sustain life.

But Uncle Sam will not give up his valuable land without fighting. He has launched a terrific battle against one of Nature's most puzzling and devastating cataclysms. He is going to try to put an end to the black blizzard.

The new warfare is carried on from experiment stations located at strategic points in the dust storm areas.

According to experts, 125,000,000 acres of land now in cultivation—equivalent to the combined areas of Ohio, Illinois, Maryland and North Carolina—had lost all or a greater part of its top soil due to wind erosion.

In the Texas Panhandle many fields lost as much as three feet of soil and subsoil. In

[Continued on page 141]

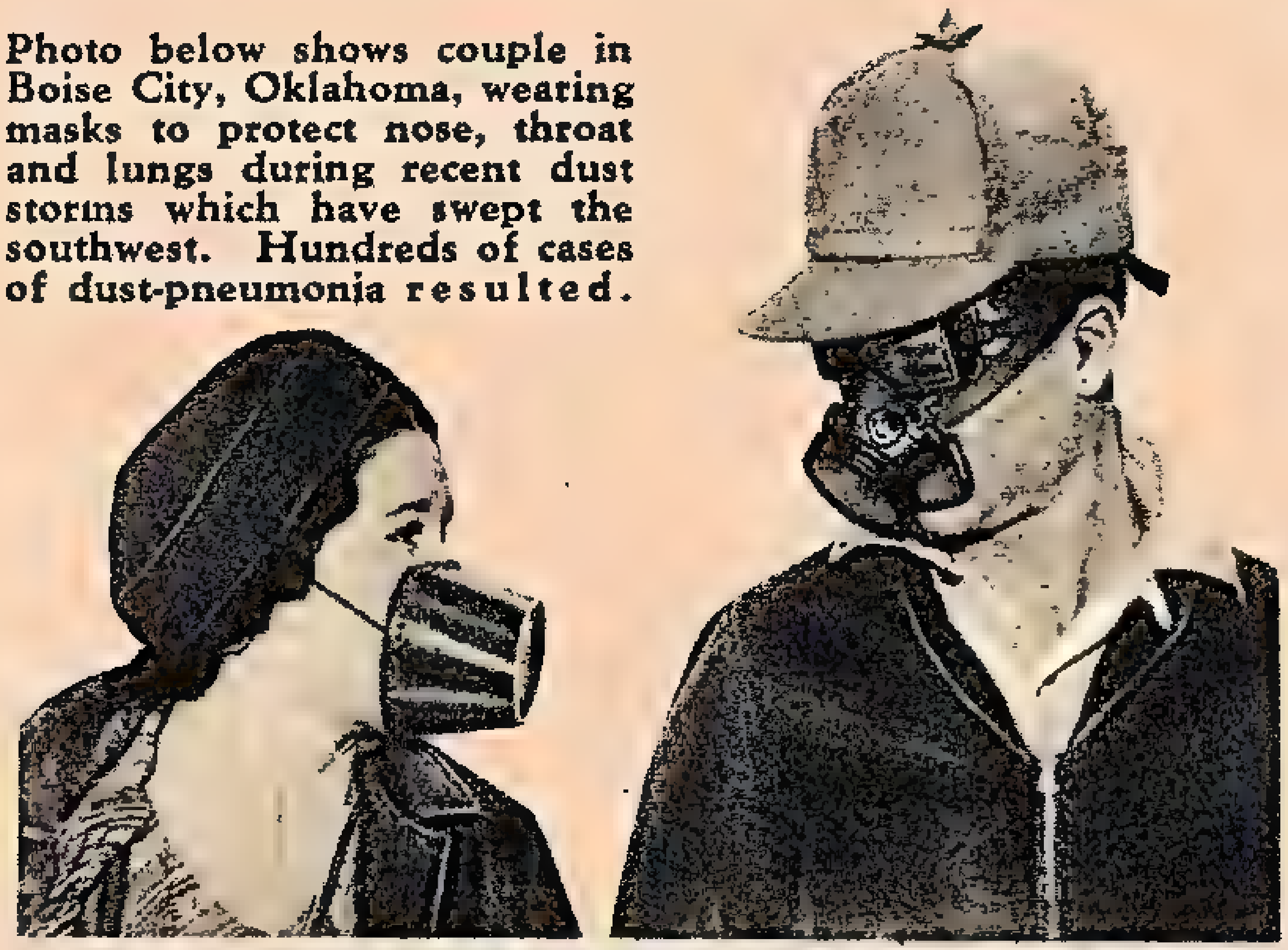
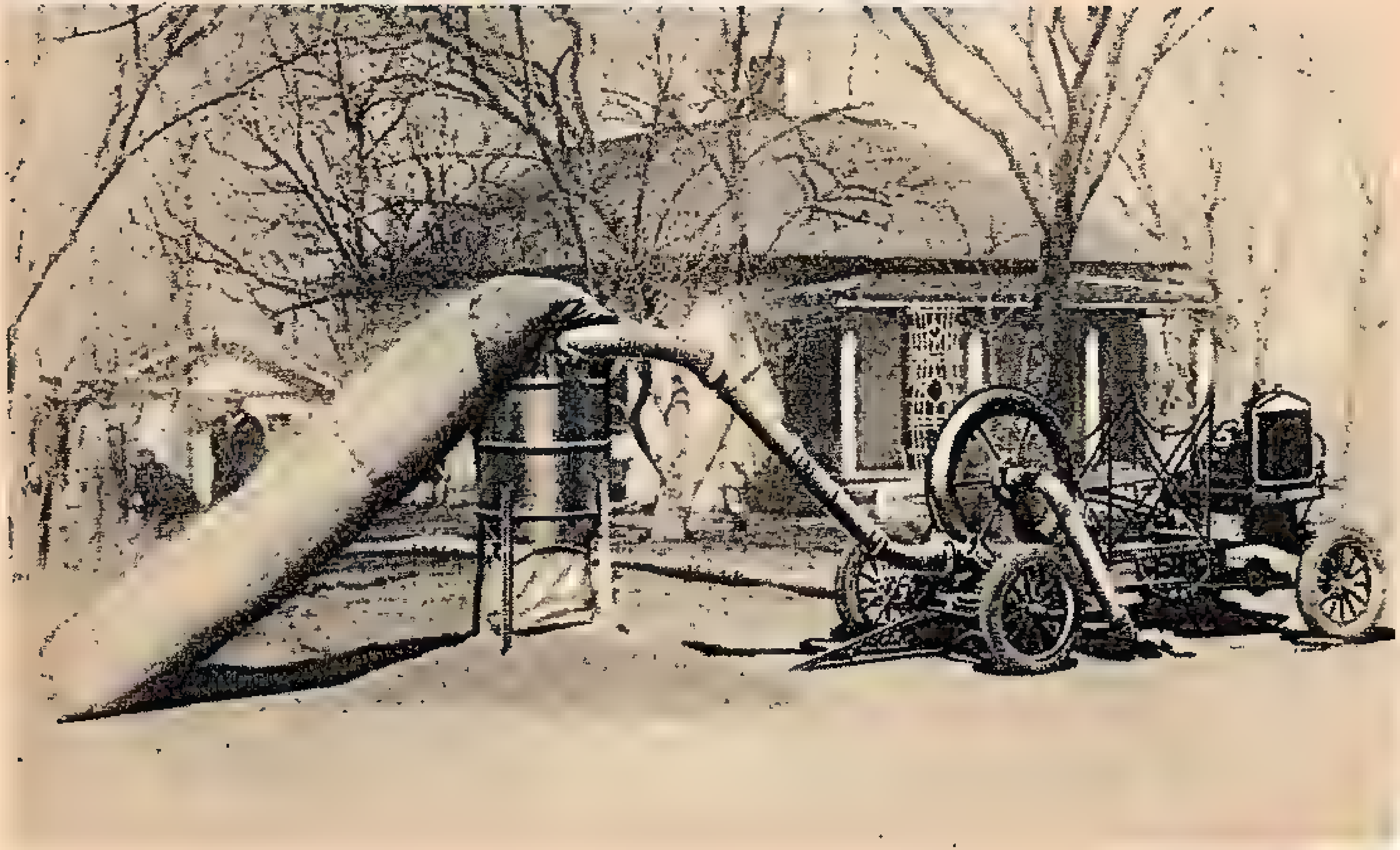
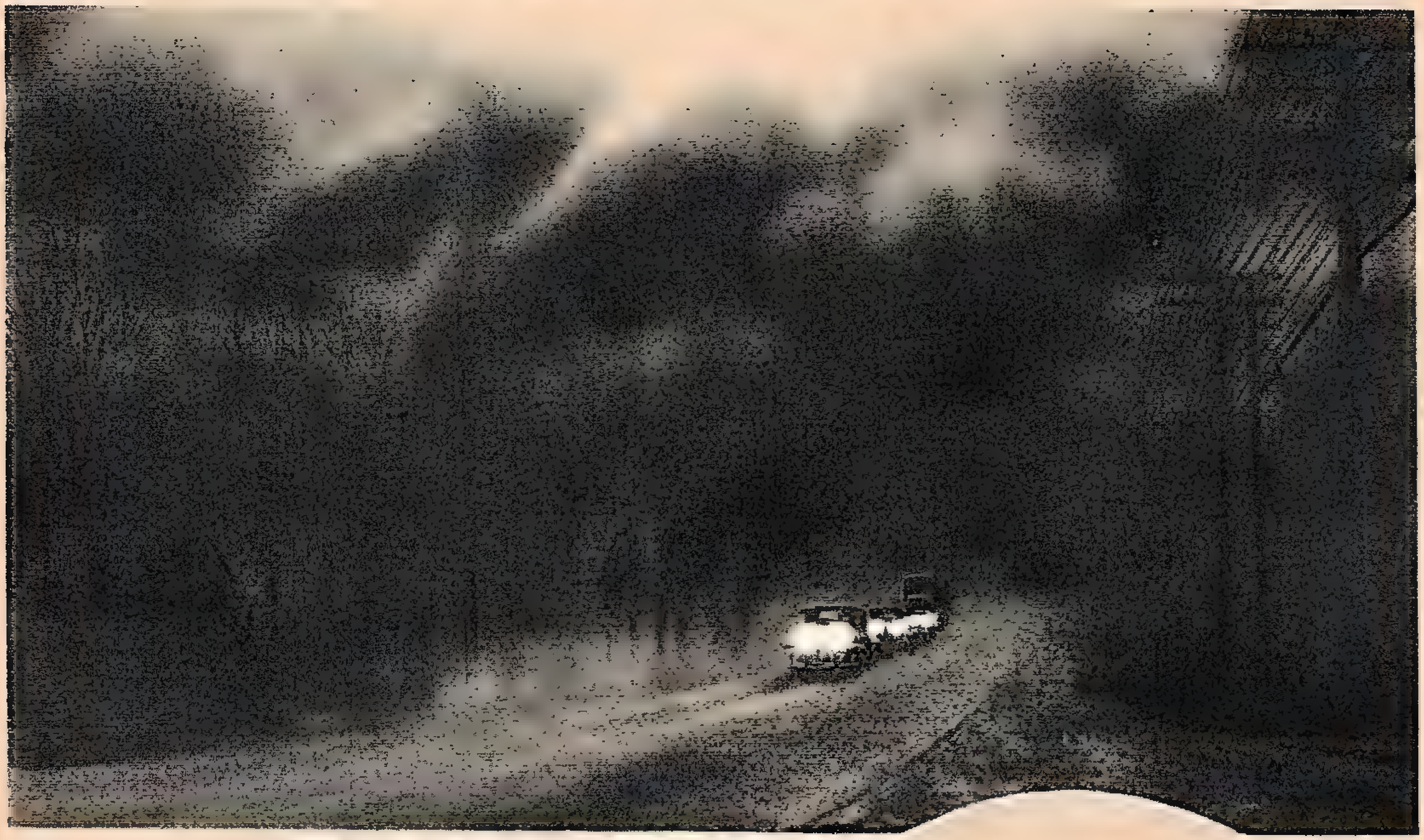


Photo below shows couple in Boise City, Oklahoma, wearing masks to protect nose, throat and lungs during recent dust storms which have swept the southwest. Hundreds of cases of dust-pneumonia resulted.



Dust settled so thickly on Kansas lawns that two mechanically-inclined men started a profitable business with the huge homemade outdoor vacuum cleaner shown above. Right—Typical scene along silt-covered road in the sand-swept Great Plains area.

The BLACK BLIZZARDS



Above—Motorists plunging through one of Missouri's black blizzards were compelled to use their headlights at high noon. Circle—Building a huge reservoir for supplying water to fertile fields. Other means of dust storm control are being tried by Uncle Sam's army of experts to conserve the valuable top soil.

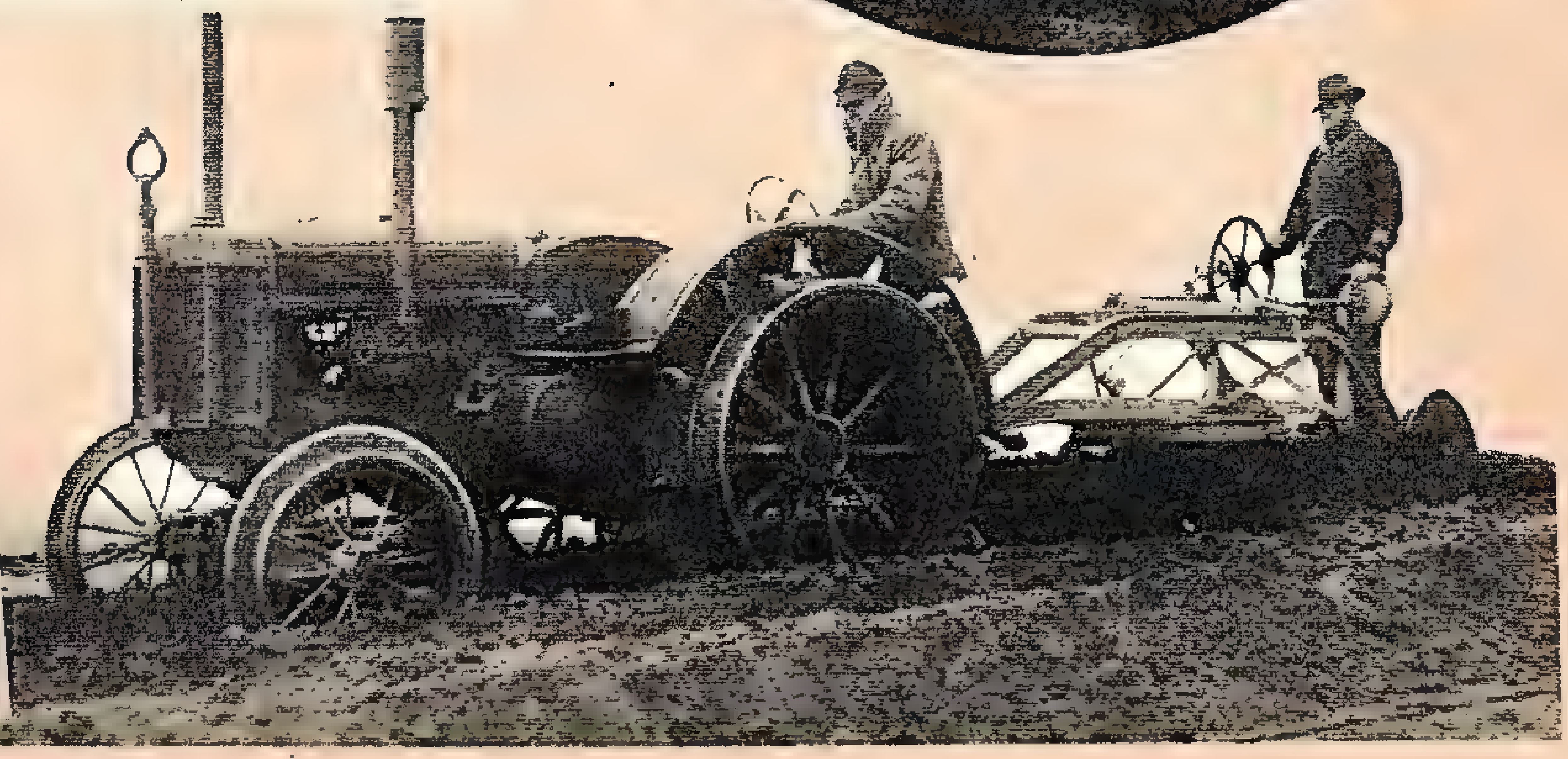
SIDELIGHTS ON THE DUST STORMS

Dust blew with such force in Kansas that it completely packed ignition locks and parked cars could not be unlocked. Highway traffic, unable to plow through the roads, was suspended.

For the first time in history train schedules were canceled on one division of the Santa Fe Railroad.

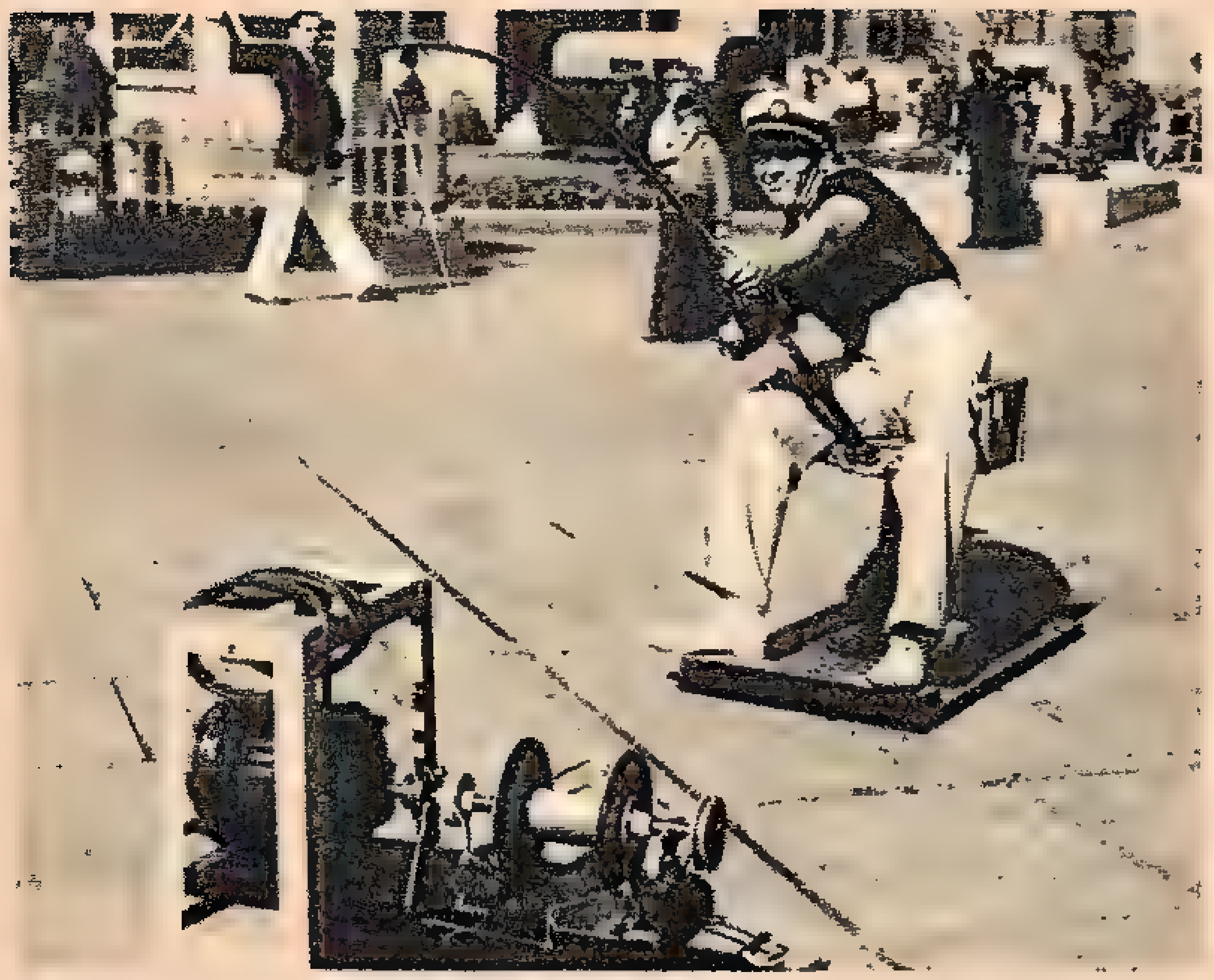
One construction company had a contract to move 10,000 cubic yards of earth in a county road project. Workmen started loosening the ground when the storm struck. When it ended, the contractor found that the wind had done his work for him.

In Oklahoma, static electricity accompanying a dust storm was of sufficient strength to shock persons who touched metal. Human hair stood on end. In Missouri, telephone, telegraph and radio reception were hindered by the electrical charge. Even cars were stalled.



Right—Constructing level terraces to retain moisture is another method employed by soil erosion experts who are fighting the dust storm menace. In the Plains area, an average of 80 tons of topsoil per acre were lost to farmers. Kansas wheat-growers have given up all hopes for a forthcoming harvest. Many will not raise enough wheat to seed the next year's crops.

Robot Swordfish Helps Anglers Train for Strenuous Sport



Line fastened to spool on motor shaft provides all the thrills of battling swordfish. Device keeps anglers in trim.

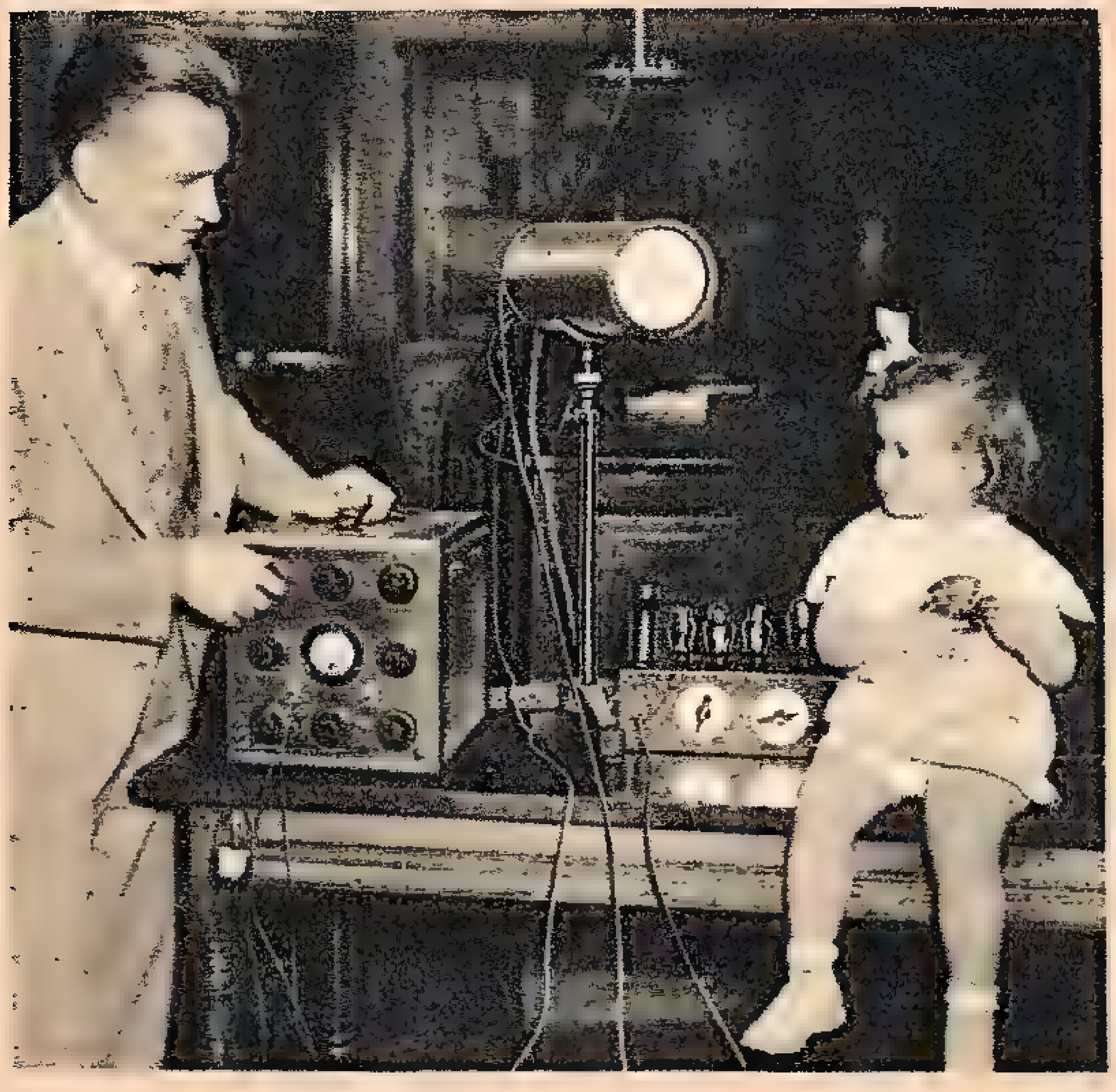
A MECHANICAL swordfish, claimed by experienced salt water anglers to be the scrappiest warrior that ever swam shoreward, has just been devised by G. M. Thompson, Los Angeles sportsman.

The robot specimen consists of a takeup spool attached to a motor having varied speeds to correspond with the sudden runs of the fish. The line is threaded through the ferrules in the usual manner. Seated in his chair, the angler keeps in trim for this strenuous sport.

Beating Heart Flashed On Screen

A NEW device, which not only amplifies the beating sound of a human heart but pictures the sound on a screen, has just been invented. Its principal use is testing the heart.

Known as a sound and electro cardiograph, the "radio stethoscope" was created as a result of numerous experiments by A. W. Krause, mechanician of the physics department of Northwestern university. When the sound-sensitive disc is held over the heart, the novel instrument makes the heart beat pound like a bass drum and produces wave rhythms on the screen. The device will aid the study of heart ailments.



A. W. Krause of Northwestern university tries out his heart-tester on his little daughter. The device produces in wave form on a screen the heart beat rhythm, amplifying the sound.

New "Silk" Glass Is Unbreakable

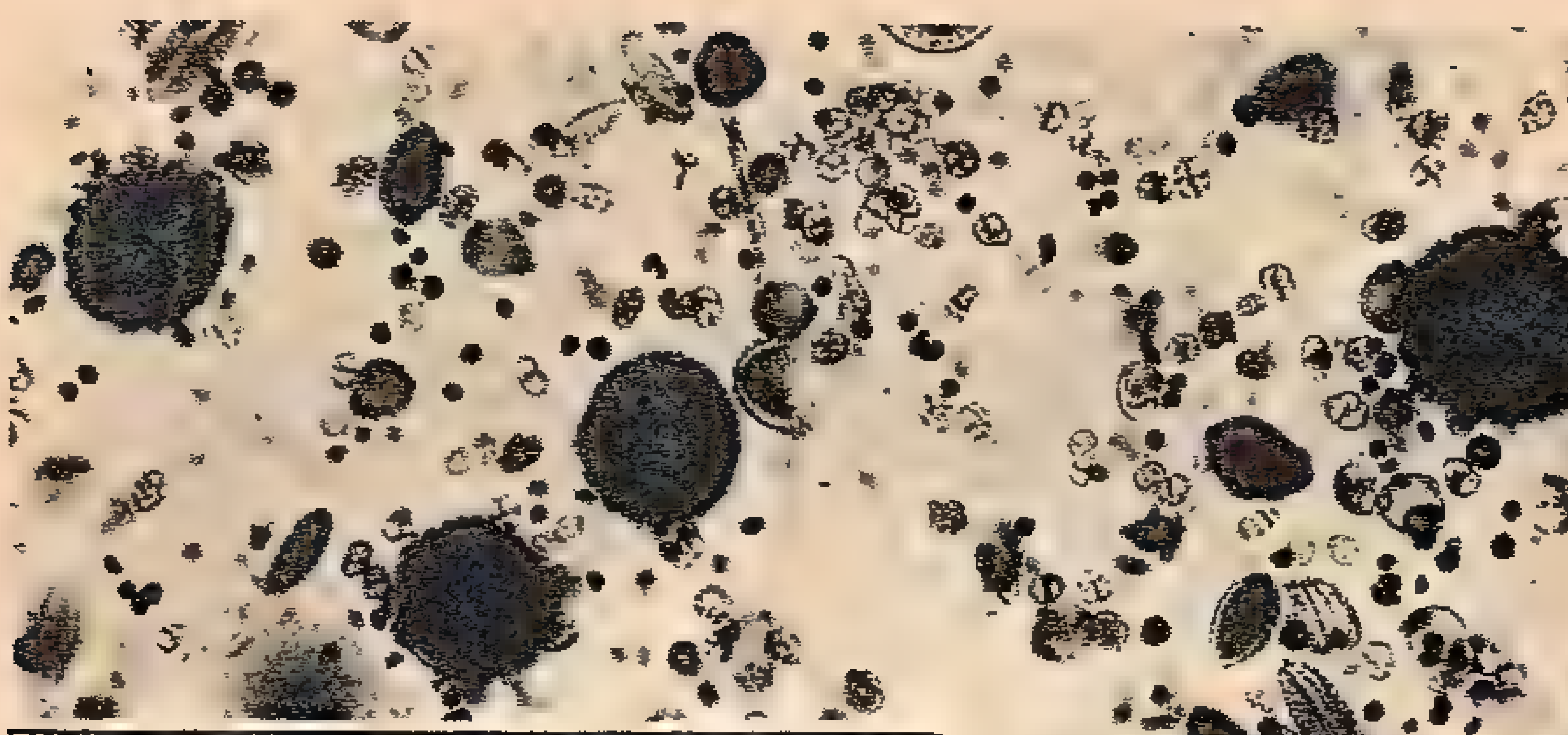
Dr. Bratring, German chemist, is seen above with waste artificial silk used in making his new unbreakable glass. Photo at left shows non-inflammable glass after attempted burning.

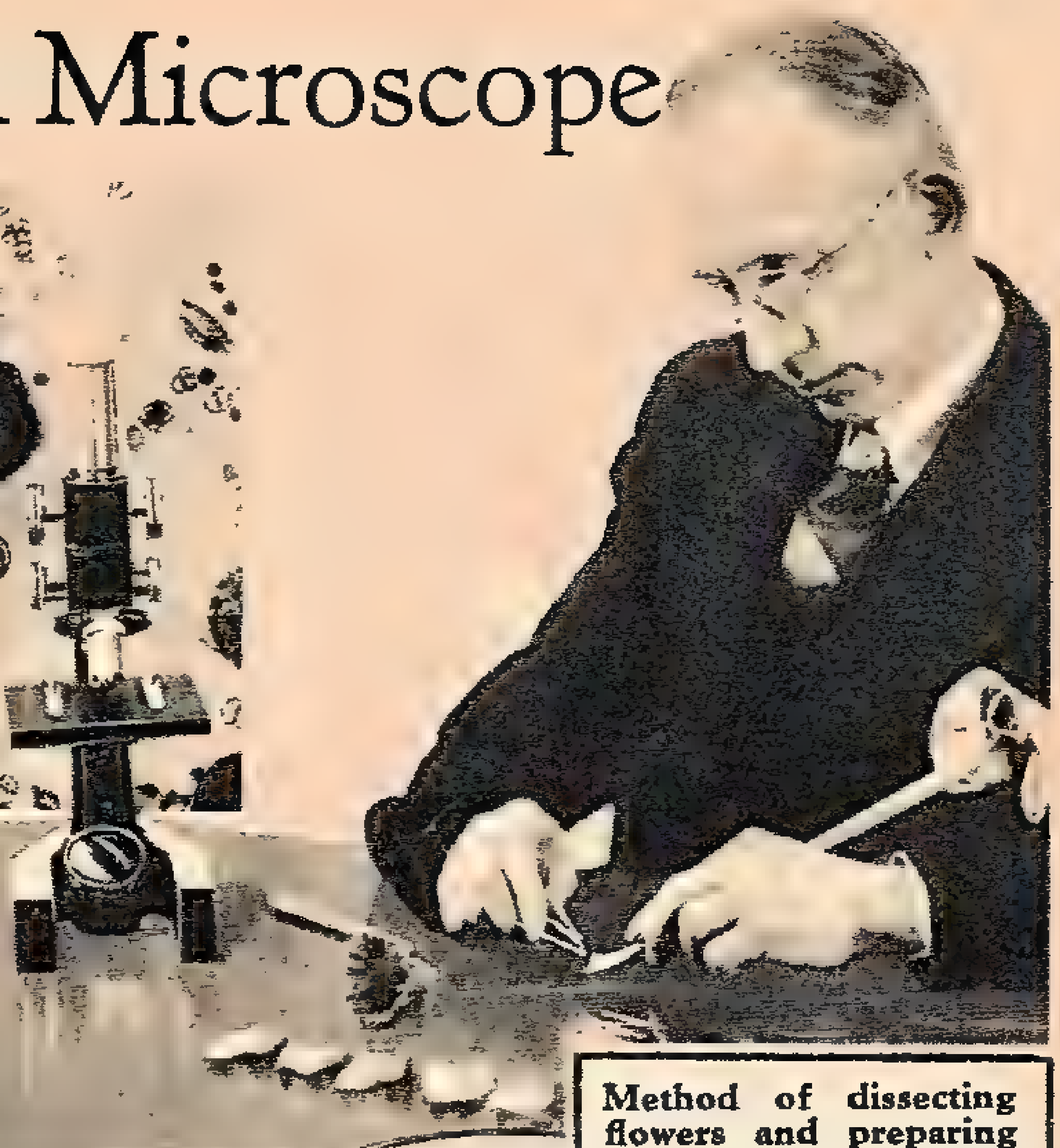
THE secret of producing unbreakable glass, found under the regime of the Roman emperor Nero and later forgotten, has at last been rediscovered by science. Manufactured from artificial silk by a German chemist, the glass is slow-burning and, like safety stock movie film, does not burst into flame. Even the waste of artificial silk can be prepared for the manufacture of these glass receptacles.

"Tin-Type" Movies Feature News

SCREENING movies of big events before theater audiences within 75 seconds after the pictures are taken is now made possible by a new invention developed recently in Berlin. The exposed film is not wound on a takeup spool. Instead, it passes directly into chemical solutions where it is developed, fixed and washed, ready for projection. The pictures are photographed from a special car which houses the camera and tanks.

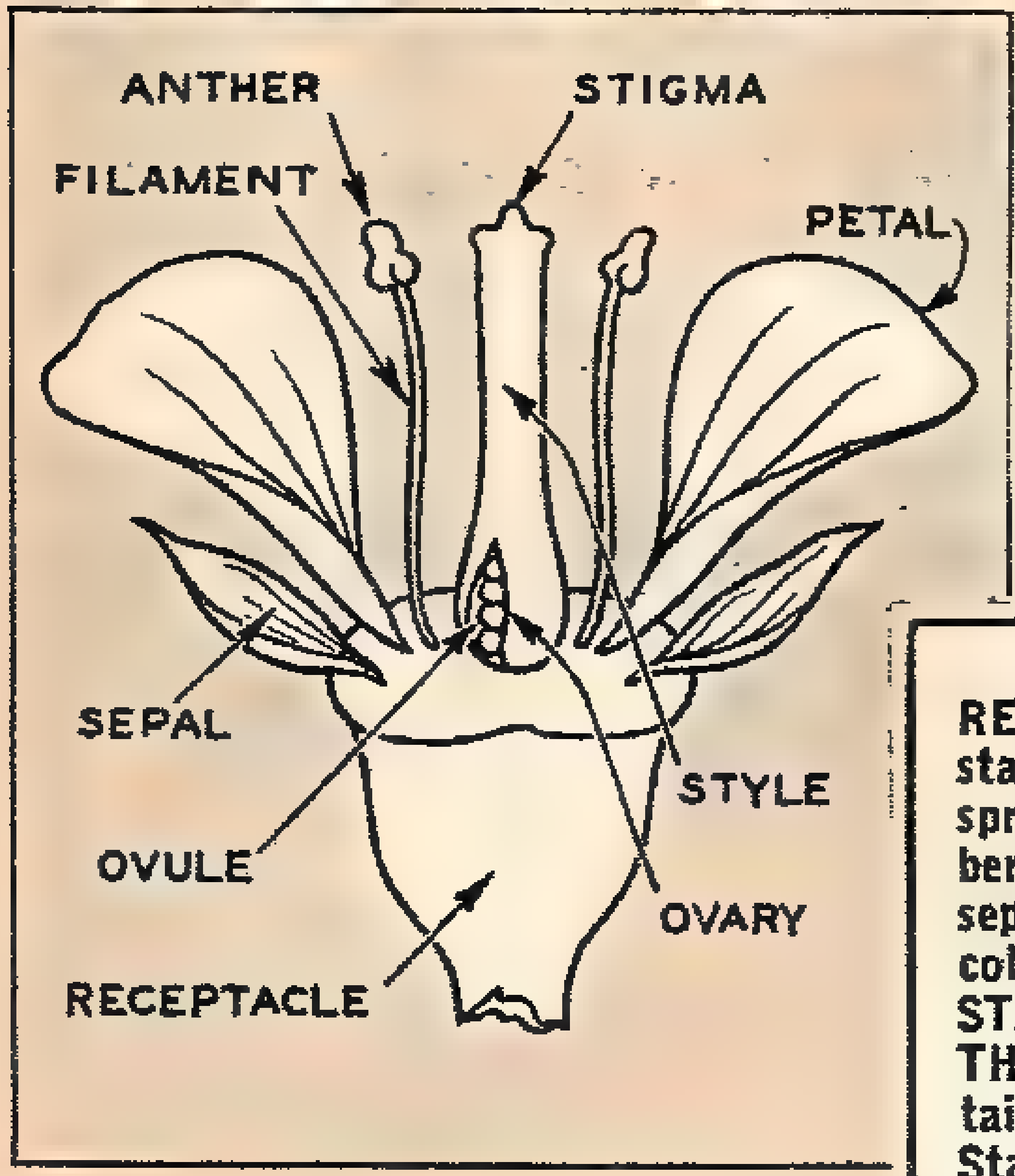
Examine Flowers With Microscope





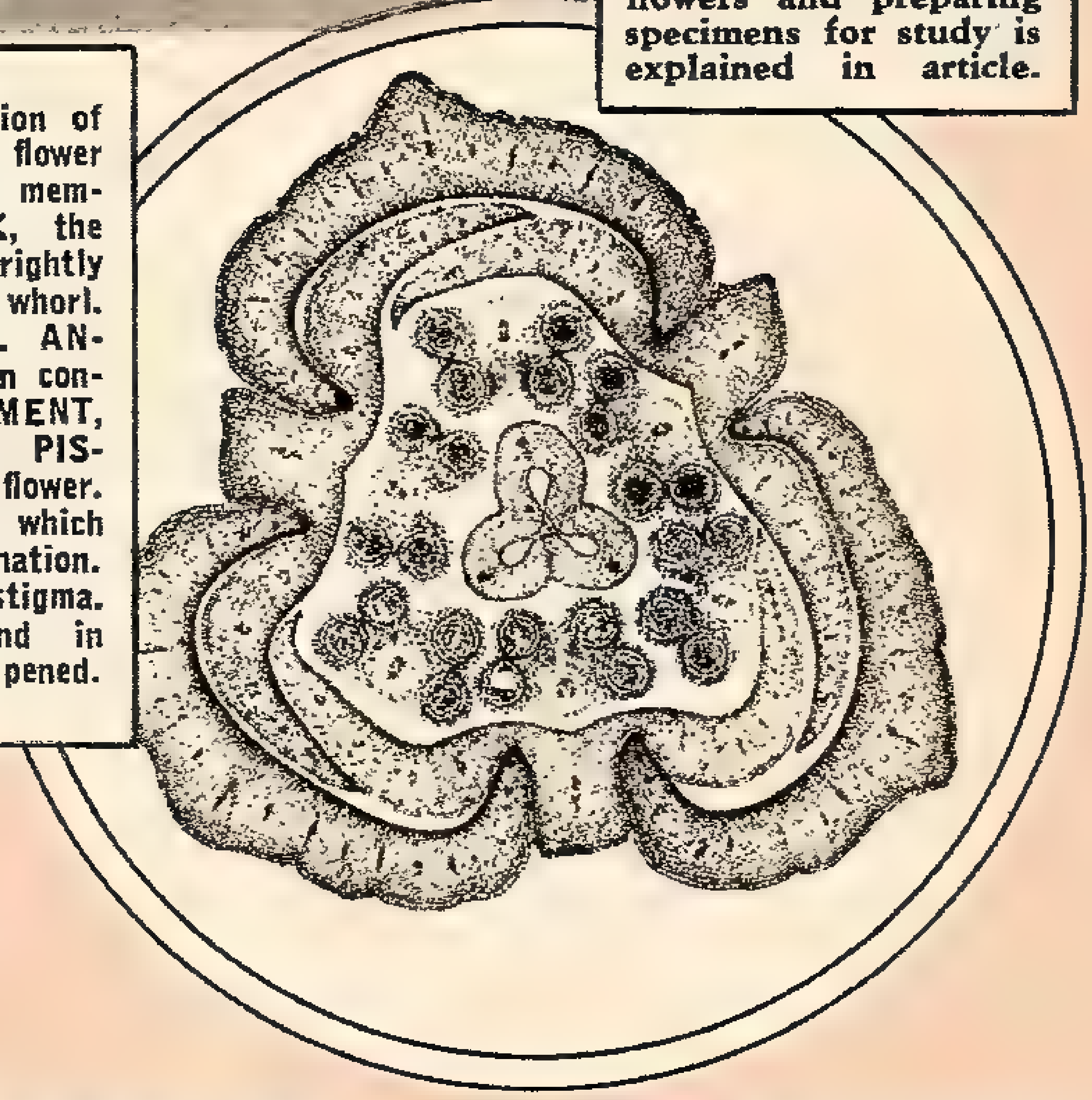
The study of flowers under the microscope lens opens up new worlds for the amateur. Mixed pollen grains, magnified, are seen in photo above.

Method of dissecting flowers and preparing specimens for study is explained in article.



Above artist's sketch shows diagram of flower parts. Microscopists will get far more enjoyment from the study of flowers if they supplement their technical knowledge with constant reference to botany books.

RECEPTACLE, terminal expansion of stalk from which parts of flower spring. **SEPAL**, green leaf-like member of outer whorl. **CALYX**, the sepals collectively. **PETAL**, brightly colored member of second whorl. **STAMEN**, pollen producing part. **ANTHER**, expanded head of stamen containing pollen grains. **FILAMENT**, Stamen stalk supporting anther. **PISTIL**, central member of flower. **STIGMA**, upper part of pistil which receives pollen during pollination. **STYLE**, pistil stalk bearing stigma. **OVULE**, immature seed found in ovary. **SEED**, the ovule when ripened.



Cross-section through young lily bud. Note the unusual clearness of the parts which are formed into concentric circles.

by JULIAN D. CORRINGTON, Ph.D.

THROUGH the lens a flower is indeed wonderfully and strangely made, and many are the queer structures and interesting adaptations open to inspection by the microscopist.

The best start can be made with several blossoms of the common buttercup. Names of the various parts may be found above.

After identifying these parts, carefully dissect the buttercup by pulling off members of the various floral envelopes one after the other, beginning with the sepals. Lay out each series in a row. Mount one example of each part in water for temporary examination or run them through a graded series of alcohols, clearing in xylol to make a permanent balsam mount.

A very instructive preparation is a cross-section through a young lily bud. Each of the parts in the unexpanded condition is diagrammatically clear, revealing the flower as a series of concentric circles.

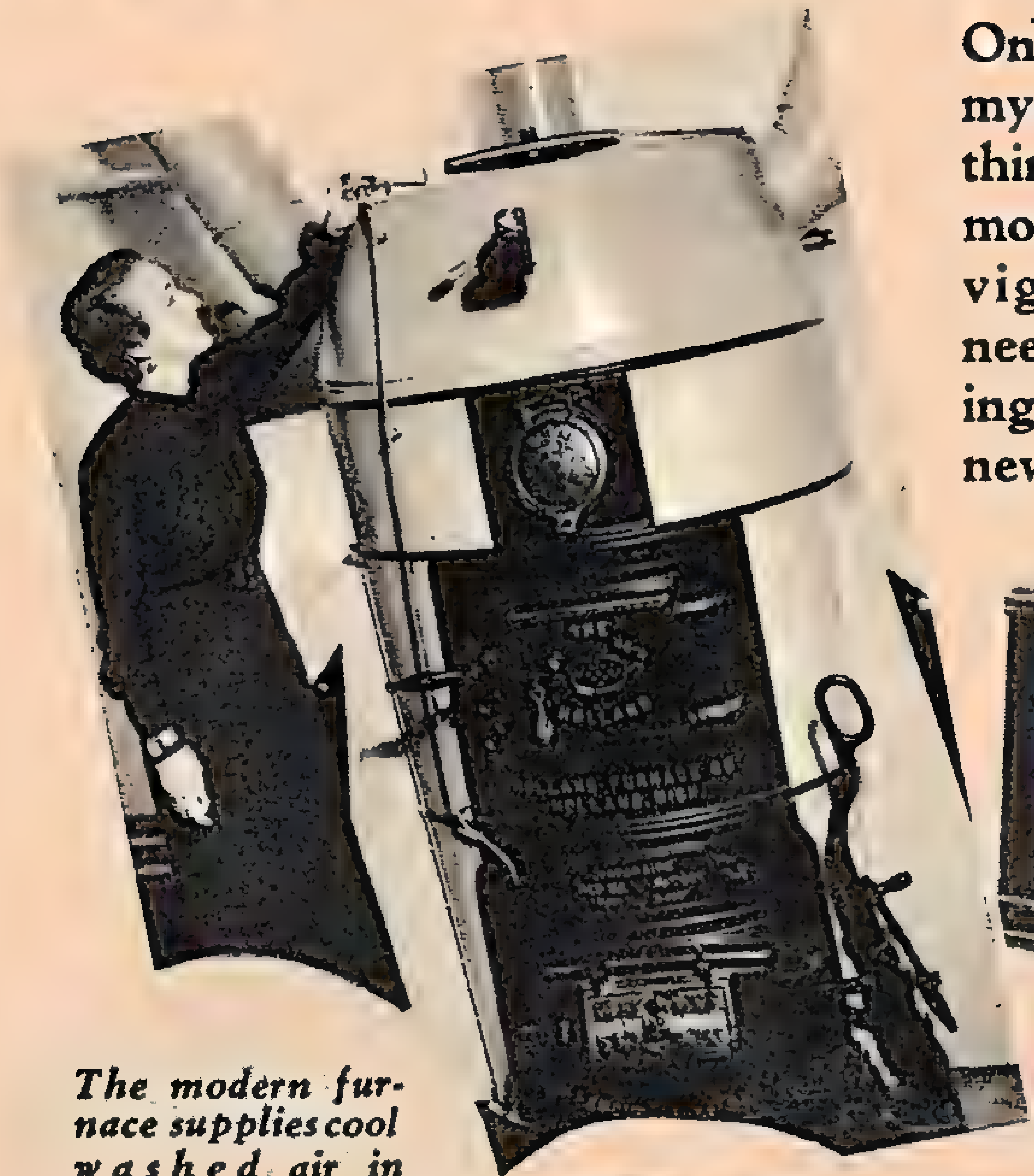
When stamens are mature, the ripe pollen grains may be easily collected for slide mounts. These make fine preparations, intricate and diverse in beauty. Hollyhock, sunflower, dandelion, squash, pumpkin, goldenrod and chickory are a few examples of dozens of desirable types. Hold a stamen over a small vial containing Bouin's fluid, and tap so as to jar the pollen grains into the fixer. After some six hours, cover the vial with a bit of linen—an old handkerchief will do—and invert to drain off the fixer. Fill vial with 50 per cent alcohol, squirting it through the linen, thus saving pollen grains which have adhered to the cloth.

After six more hours, replace this wash with 70 to 80 per cent alcohol, and an hour later change to a one per cent solution of either light green or eosin in 95 per cent

[*Continued on page* 133]

REVAMPED FURNACES

On the trail of that mysterious "something" that makes mountain air so invigorating, engineers are developing "super-air" for new home comfort.



The modern furnace supplies cool washed air in summer, clean heat in winter. Above: Adjusting water valve.

Above is a typical room air conditioning unit, which delivers washed air to lower the humidity.

Modern "weather-making machines" screen tons of dirt each year from the air we breathe. Dirt above was taken from a furnace filter.

What does electricity do to air? Dr. E. Vernon Hill (left) pioneer research authority, seeks the answer to this question by charging air with high voltage electricity, or ionizing it. He finds that negatives ions stimulate mental powers.

COOL The Modern Home

by PAUL DARROW PADDOCK

HUMAN beings are serving as guinea pigs in an eastern laboratory where a series of interesting experiments is under way to improve "man-made weather," to make furnaces cool as well as heat our homes, and to reproduce that "mysterious something" found only in mountain and seashore air.

Scientists are on the track of a clue that may lead to the development of "super-air," even better for human health and comfort than that found in nature. They believe the secret lies in the free ions or electrically charged particles that exist in natural air.

Well educated, normal persons are required for the "super-air" tests. Exposed for awhile to an unusual bombardment of positively charged ions, they become groggy. They cannot do such simple things as add columns of figures, scientists report.

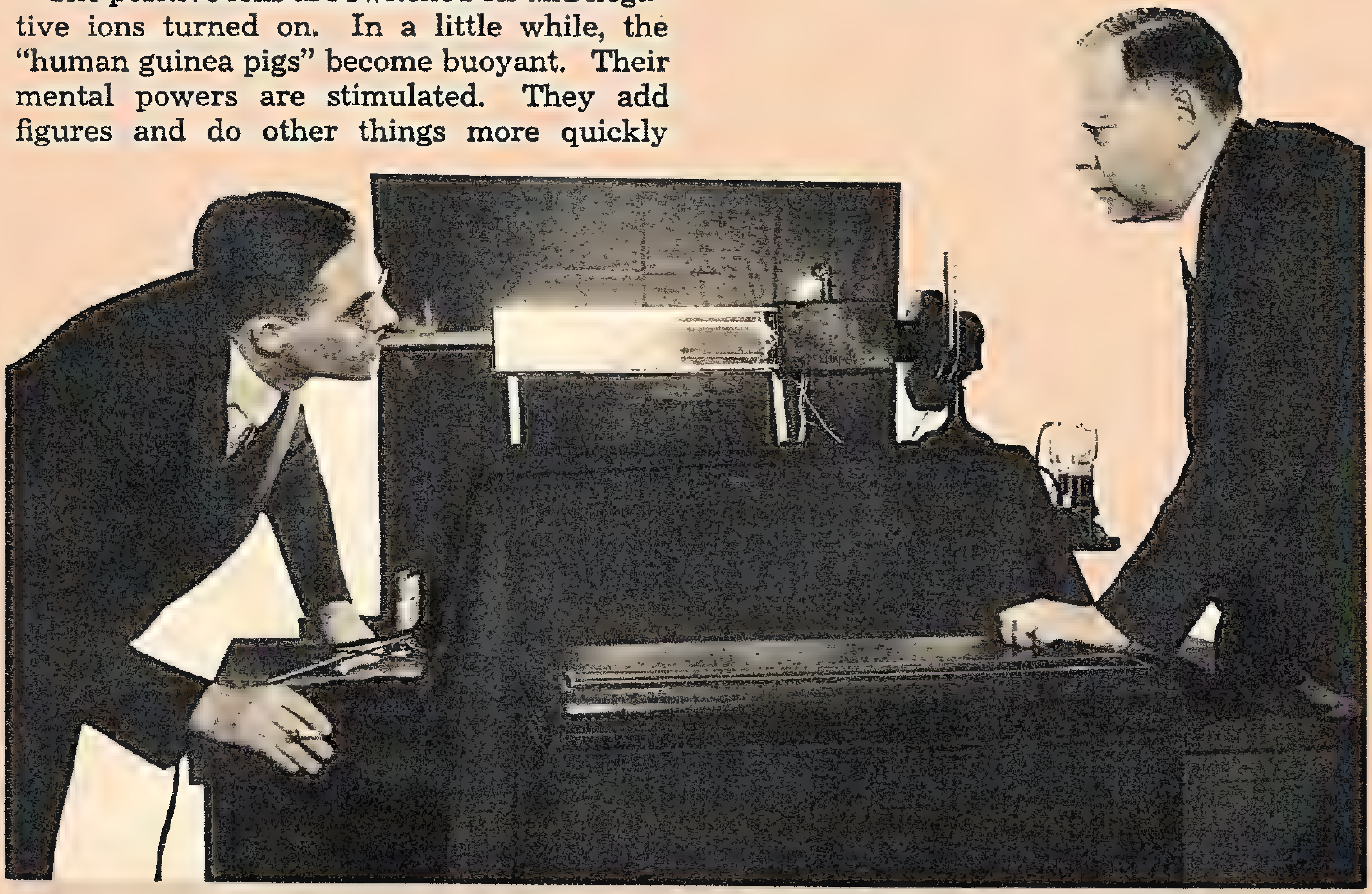
The positive ions are switched off and negative ions turned on. In a little while, the "human guinea pigs" become buoyant. Their mental powers are stimulated. They add figures and do other things more quickly and more accurately than normally. These tests, pioneer experiments in man's fascinating and comparatively new field of science, *air-conditioning*, are as yet inconclusive, but indicate that some day an electrically treated air, rich in health-giving qualities, may be made available in every home and office building.

Most of man's energy comes from the air. Although an average adult consumes only three and one-half pounds of food and four pounds of water a day, he takes in more than thirty-four pounds of air in that same time.

Recent investigations indicate that cosmic rays may have a great deal to do with human comfort, through their effect on the air.

Normally, Dr. L. W. Chubb, director of research at Westinghouse Electric and Manufacturing Company points out, the air contains ozone, and is free from dust, fumes, and

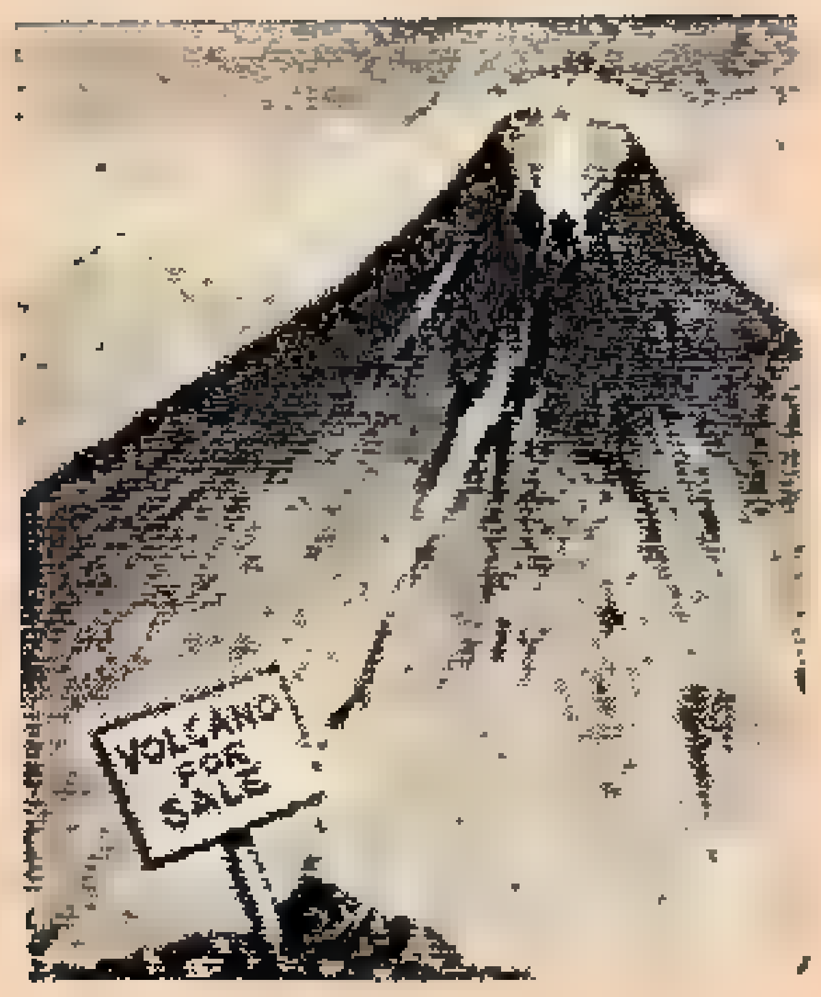
[*Continued on page* 143]



"Normally our air contains ozone, is clear and odorless," points out Dr. L. W. Chubb, director of research at Westinghouse. "In the big cities smoke and fumes cut off ultraviolet light, reduce ionization, and leave for us a stuffy, vitality-lacking air." In the above photo research engineer G. E. Penney demonstrates to Dr. Chubb the operation of an electro-static air cleaner. Electricity disintegrates smoke blown in at the left.

PARAGRAPH ODDITIES OF SCIENCE

MOUNT POPOCATAPETL, highest smoking volcano in North America, has been up for sale for the last 30 years. $10,000,000 will buy it from the Mexican government.—Irving Wallace, Kenosha, Wis.

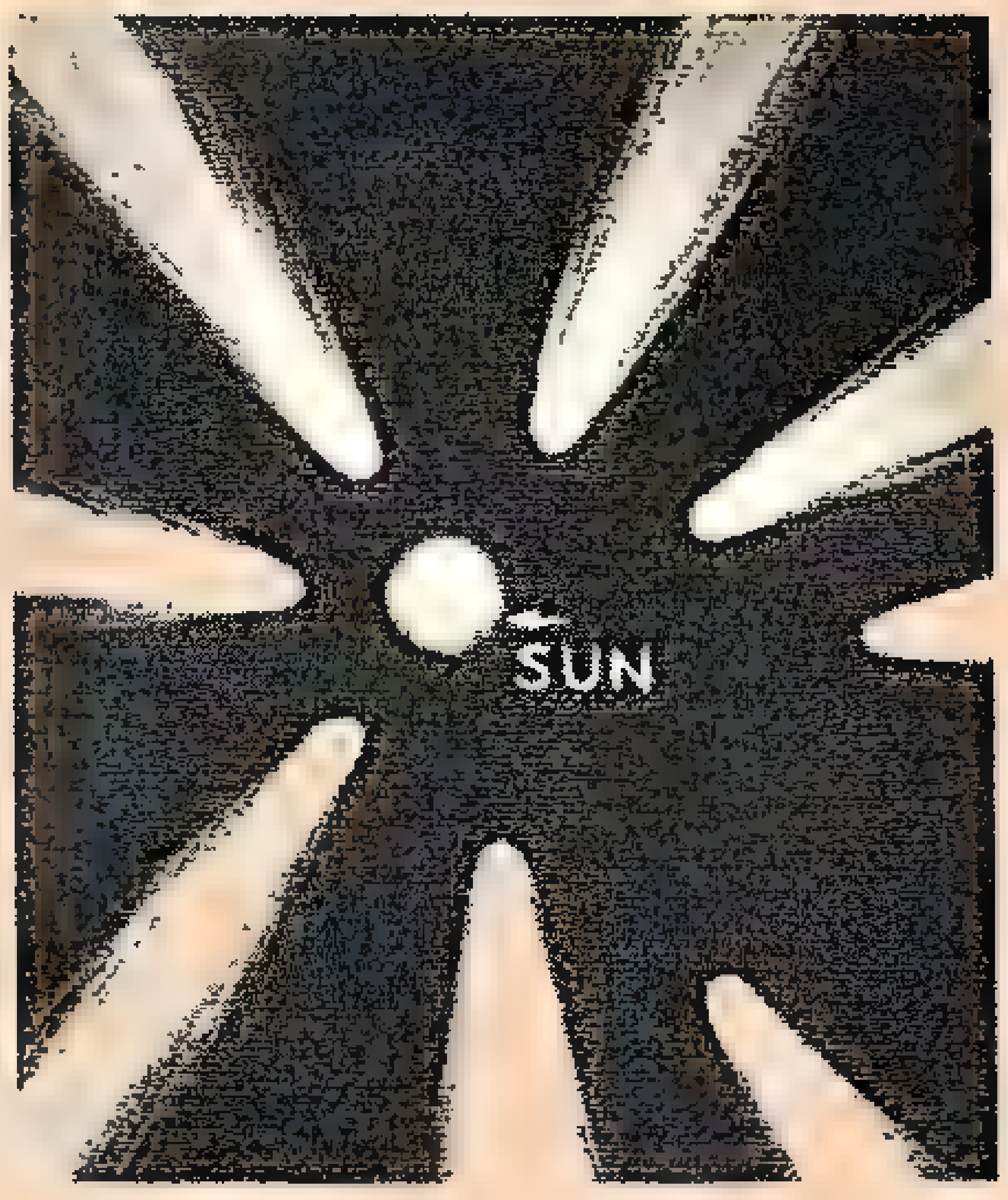


Silk worm thread has greater strength than the finest steel wire of similar size.

Mud is employed as a cleansing agent for rotary drilling equipment used in the oil fields.

The common earthworm has approximately 150 pairs of kidneys.—Charles F. Tweeddale, Fredericton, N. B., Canada.

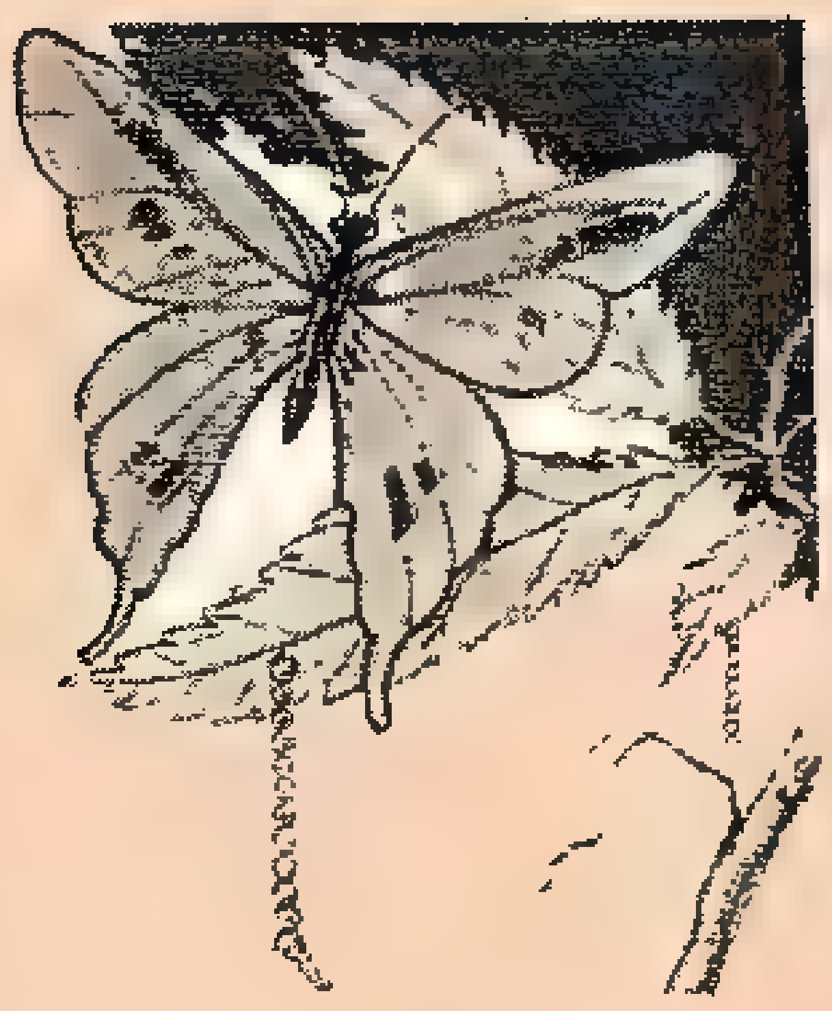
A pair of Oriental gray rats can produce 359,760,824 offspring or 18 generations within three years.



Sound travels faster on hot days than on cold days. There is a difference of two feet per second for every degree Centigrade the temperature is raised. The molecules of air are in more rapid motion and carry the wave faster.—Ed Walsh, St. Paul, Minn.

Dry ice is used to freeze quicksands encountered during exacavations for skyscrapers.—Edward Merdinyan, Pawtucket, R. I.

Light has weight, but an ordinary electric lamp would have to burn 2,000,000 years to produce an ounce of light.—Jerome A. Wack, Piqua, Ohio.



Hop Merchant butterflies lay their eggs in columns attached to leaves. In order that the chain may not be broken, the last laid eggs hatch first. —Bernard Miossi, Jr., San Luis Obispo, Calif.

The Florida mullett is the only fish which has a gizzard.—Mrs. E. M. Kelley, Wilmington, Del.

The octopus uses the rocket principle to propel himself. The reaction of water expelled through a tube forces the body along.—P. L. Goodwin, Manchester, N. H.

Cows have been found in Hawaii which never drink. They quench their thirst through the air they breathe or by cropping wet grass.

A gold thread can carry as much electricity as a 4-inch copper cable.—R. H. Gorder, Ft. Peck, Montana.

Honey mixed with the proper oxidizing agents and tested in a bomb calorimeter is a powerful explosive.—Sherman Watson, Alfred, N. Y.

A comet approaching the sun from the depths of space has no tail and cannot be distinguished from a planet. When nearer the sun, the tail begins to grow and may reach a million miles in length. The tail does not stream out behind, but, because of repulsive forces, the tail always points away from the sun.—Frank Scott, Winnipeg, Manitoba.

An average size oyster drinks for about 20 hours daily, consuming 15 gallons of water. — Eugene Henley, Durham, North Carolina.

The longest span of wire in the world is used for a telegraph in India. It is 6,000 feet long.—Fred Eickhoff, Long Eddy, N. Y.

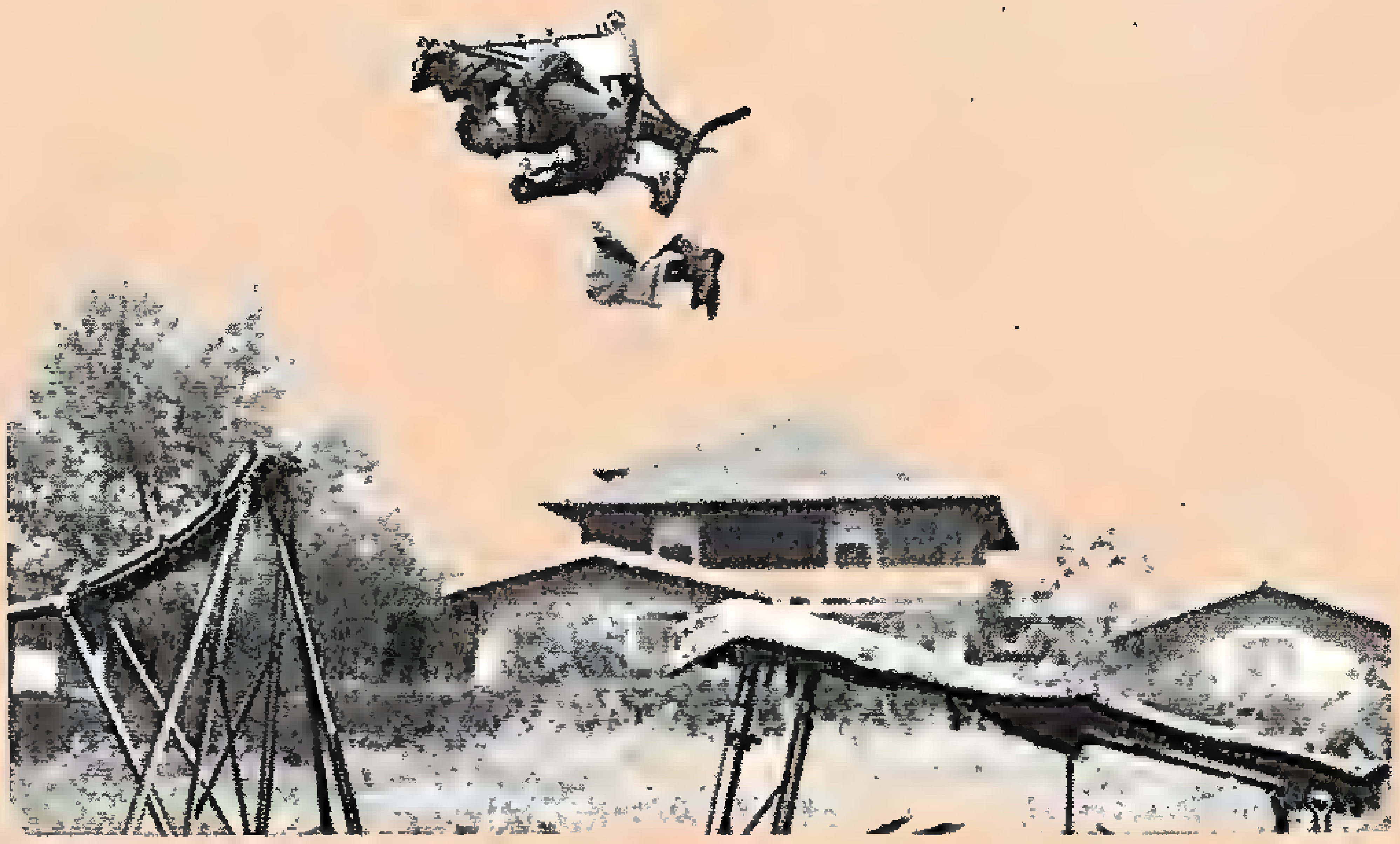
One dollar will be paid on publication for every Paragraph Oddity accepted. State source or proof. Do not include Oddities with contributions or letters for other departments. No items will be returned.

Stunt Man LOOPS Loop on Skate Sled

LOOPING the loop on a roller skate sled holds no terrors for Fred A. Deline, Los Angeles acrobat.

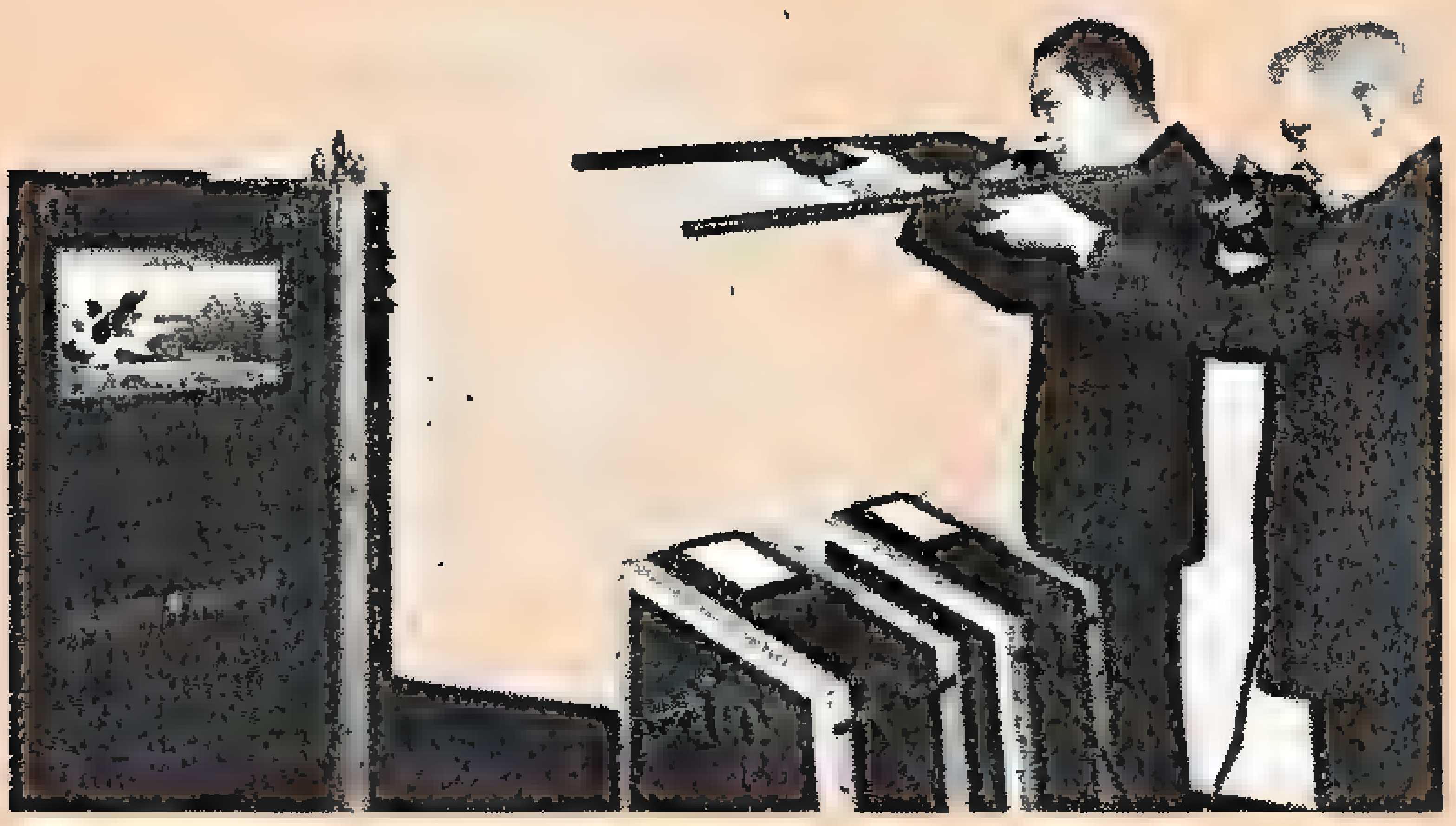
Mr. Deline, who often doubled for the late Lon Chaney when the movie script required the services of an acrobatic stunt man, straps a four-wheeled sled to his back, shoulders and legs. The vehicle is padded to reduce the shock of the sudden impact. The stunt man's head is protected by a helmet-like hood attached to the framework of the sled.

To perform the stunt, perfect timing is essential. With the apparatus on his back, he slides down the sharply-inclined chute, spins once in the air and lands feet-first on the springboard.



With roller skate sled strapped on his back, Fred A. Deline, stunt man, slides down chute to perform single loop. Although injured performing the stunt, he now plans a double somersault. Accurate timing is necessary.

Birds Hit With Bullets of Light



Trap-shooting with light-bullets is Chicago's latest sport. When light from gun hits electric eye on bird, target falls thus recording marksman's score. The new game is noiseless.

BULLETS of light instead of the usual lead shot are being employed by Chicago's sportsmen in a new trapshooting game.

The sport, which is said to be absolutely noiseless, may be played in an ordinary hall. It is held to be a valuable aid in perfecting marksmanship.

Photo-electric cells are mounted in the bodies of duck targets which move across a panelled opening at one end of the room. Each gun has its source of light which flashes on when the trigger is pressed.

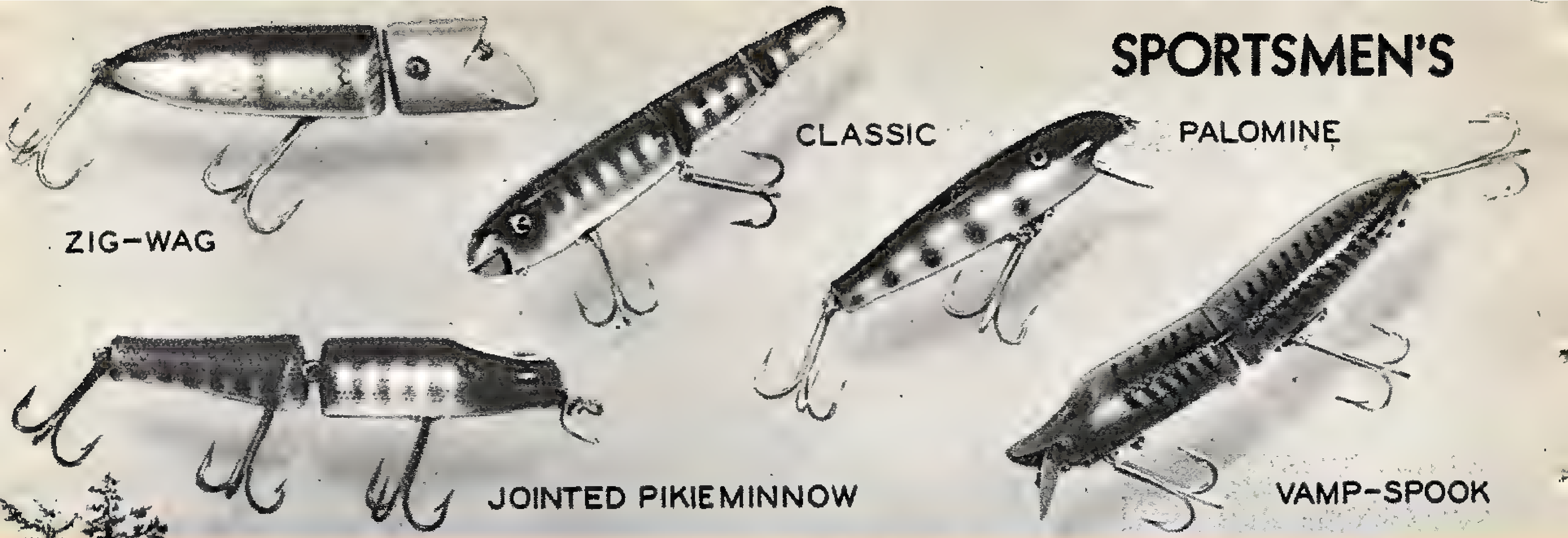
If a marksman "hits" the photo-electric cell directly in the center of the bird's body, the duck falls and the number of respective hits is registered automatically in light.

Radios Lecture to Sick Student

RADIO recently came to the assistance of a bed-stricken college student in Philadelphia. Unable to attend class lectures in order to pass his forthcoming examinations, Galen Young arranged to have a radio loud speaker, with reverse current, installed on the desk of the teaching professor. Lying on his hospital cot several miles from his classmates, Young was able to hear through a loud speaker installed in his room the identical lecture which his fellow students were attending.

The magnetic speaker placed on the instructor's desk was claimed to have served nicely as a microphone for conveying the lesson.

When illness prevented Galen Young, left, from attending classes. A loud speaker, with current reversed, brought the lecture from teacher to student.

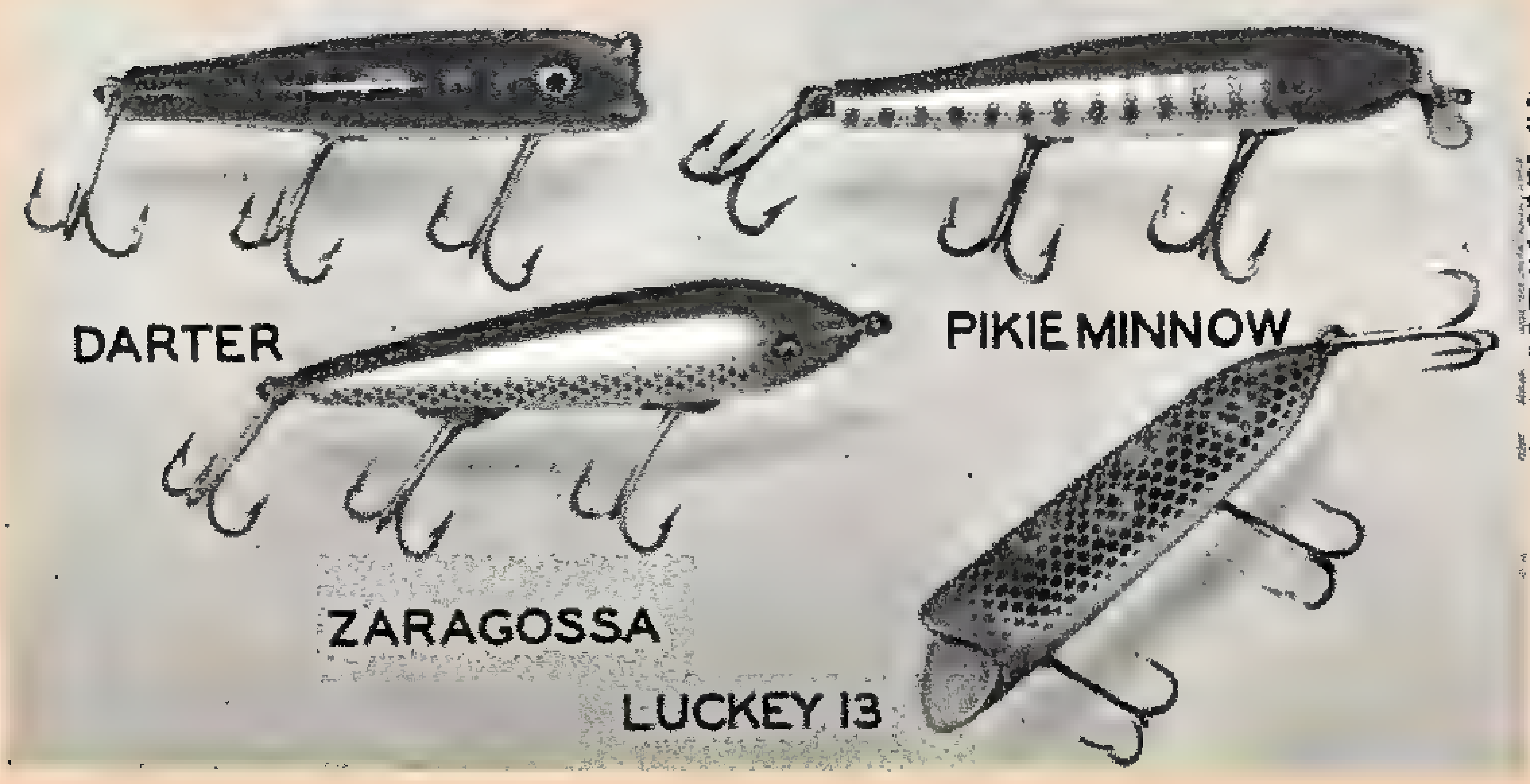

ZIG-WAG
CLASSIC
PALOMINE
JOINTED PIKIEMINNOW
VAMP-SPOOK

Choosing "SURE SHOT"

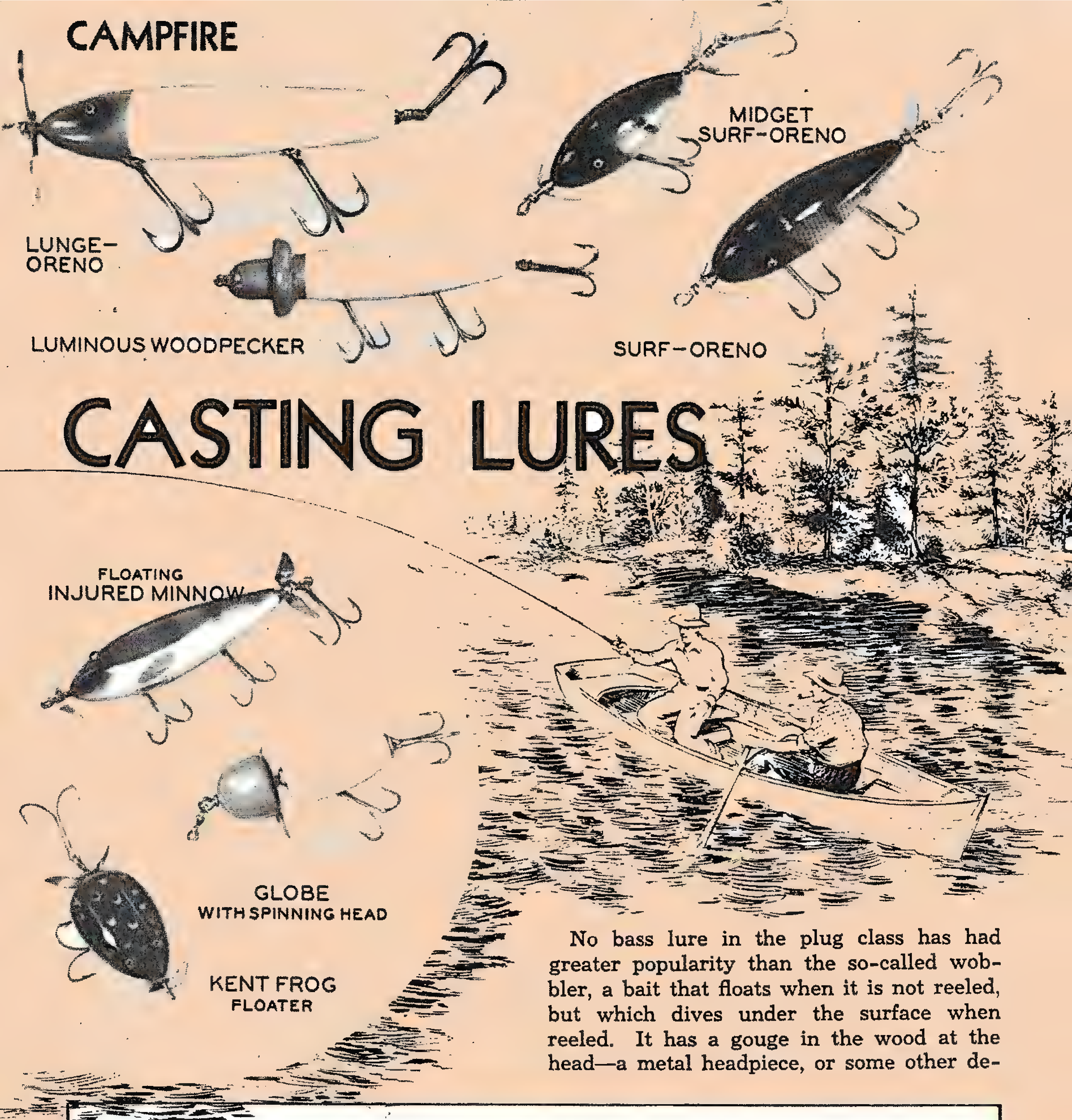
by **ROBERT PAGE LINCOLN**
Hunting and Fishing Editor

OF ALL the lures used in bait casting for bass none are as popular or more effective than bait casting plugs. There are thousands of these plugs on the market. If you are unacquainted with them, making a selection for the average tackle box is a difficult task. Here is a review of some of the most successful and popular plug lures and the type of fishing for which they are best suited.

Plug lures may be divided into three classes, namely: the surface lure that floats without diving, quartering, and otherwise setting up a fuss under the water; the surface lure that floats when not reeled, but which, when reeled, goes under the surface and weaves along in the familiar wobbling action; and, third, the weighted or heavy underwater plug, which has lead countersunk on its underparts to carry it deep in the water to get fish that lie deep. Among these three classes of plugs one makes his selection.


DARTER
PIKIE MINNOW
ZARAGOSSA
LUCKEY 13

CASTING LURES



No bass lure in the plug class has had greater popularity than the so-called wobbler, a bait that floats when it is not reeled, but which dives under the surface when reeled. It has a gouge in the wood at the head—a metal headpiece, or some other de-

SELECTIONS FOR YOUR TACKLE BOX

THE WOBBLERS

BASS-ORENO—a very popular plug, known mostly for its red head and white body. Comes in other colors also. Intended to be cast and reeled right in.

ZIG-WAG—a jointed plug that is one of the most erratic and lively in action. Also can be popped or plunked on the surface.

PIKIE MINNOW—in either jointed or solid body types is one of the most effective plugs. Both are killers for bass, muskies, pike and pickerel. Dives deep when reeled or trolled.

CLASSIC MINNOW—a life-like surface wobbler that attracts practically all game fish. Cast up among lily pads, it is one of the most natural lures.

PALOMINE—has an attractive wobbling, wriggling, and diving action. Floats when not reeled. Also comes in jointed style. A favorite with game fishermen.

JOINTED VAMP SPOOK—a transparent plug that outlasts many wooden lures. Has a lively swimming action. A good all-around lure.

DARTER—darts about near the surface in exceptionally life-like manner. Best suited for popping.

ZARAGOSSA—a famous lure in the South, but equally good in the North. Floats, but dives when rod is jerked. Performs like wounded minnow.

LUCKY 13—a typical plunking or popping lure. When reeled operates under the surface like a wobbler.

SURFACE LURES

LUNGE-ORENO—a large bait very effective for muskies. Propeller stirs up water to attract fish.

SURF-ORENO—midget size good for bass. Larger size for bass and muskies. Front and rear propellers churn water. Red and white style good for dull days.

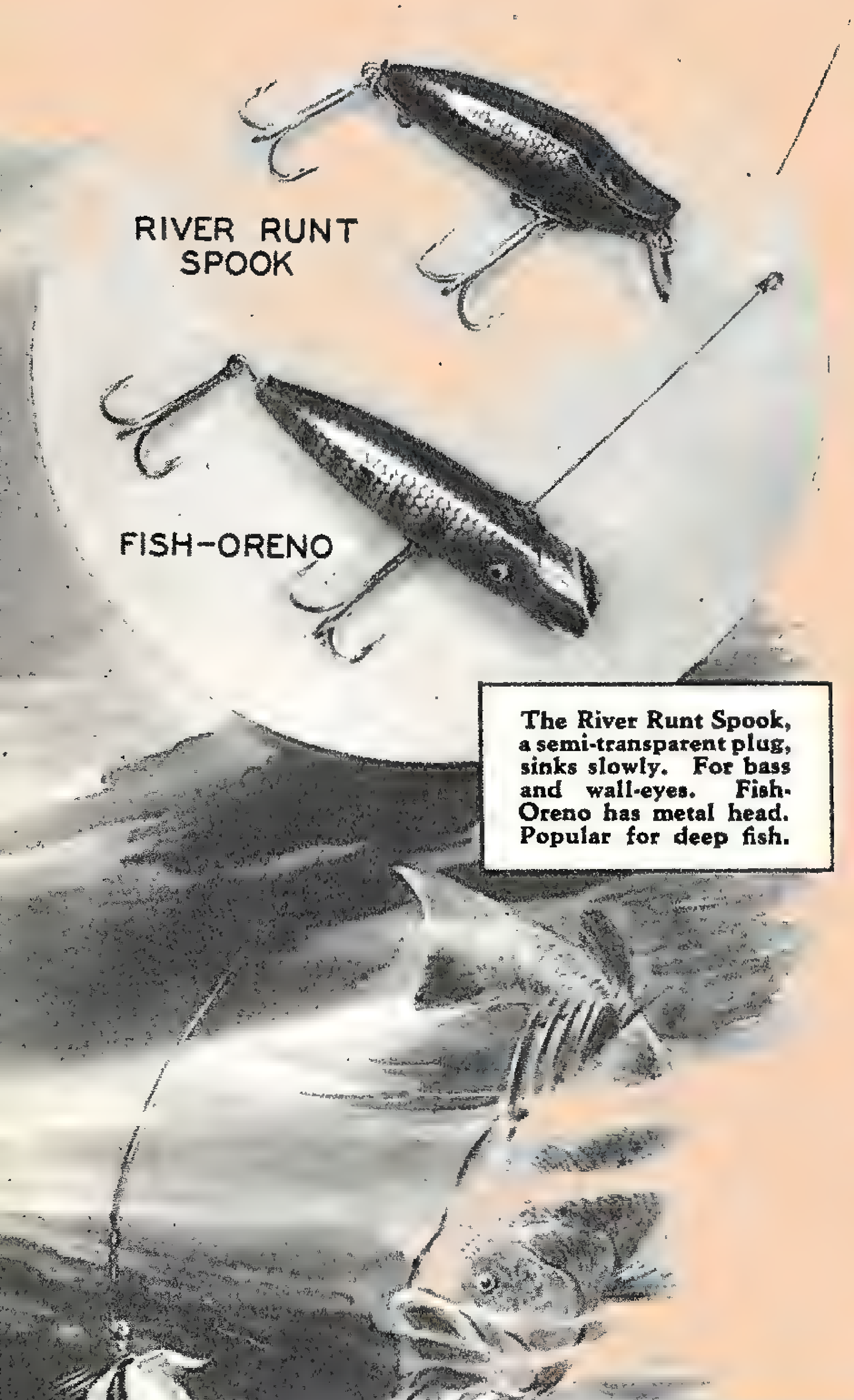
WOODPECKER—a luminous bait that is very effective at night. Stirs up water by means of concave collar.

INJURED MINNOW—lies on its sides and when jerked with rod-tip acts like struggling, injured minnow.

GLOBE—a revolving head lure that is effective in the evening, at night, just after daybreak, and on grey days. A sound making surface lure, especially good for roiled stream water.

KENT FROG—ideal for working among pads and weeds, as upturned hooks make it practically weedless. One propeller turns to right, the other to left.

UNDERWATER LURES For those Deep Fish



The River Runt Spook, a semi-transparent plug, sinks slowly. For bass and wall-eyes. Fish-Oreno has metal head. Popular for deep fish.

vice, which makes it weave along in the water in a lifelike manner. This erratic action probably convinces the fish that the bait is a small fish that has been maimed. Since fish in search of food are always attracted to a maimed or injured minnow, the chances of a catch with the use of a wobbling plug lure are great. The wobbler, therefore, in one style or another should be in your tackle box as one of the certain fish-getters. When making the selection some thought should be given to the color of the plug. On grey and rainy days, or when the water is somewhat dingy or obscured, or in the twilight or at dusk, the all-white wobbler with the red head is a very good selection. On bright days the darker wobblers can be used.

While on the subject of wobblers, we might mention the proper way to use them. When the lure drops to the water, allow it to remain there for a minute or so, then give it a jerk, popping it. Again allow a pause, then pop it again. Do this two or three times, with pauses in between.

In the class of wobblers are to be found the so-called "popping" or "plunking" lures. Although the wobbler, of the famous red-head type, is meant to be cast and reeled right in, without jerking it to make a popping or plopping sound on the surface, there are lures that fill the gap in this respect. They have a very erratic action, dipping, diving, quartering, and giving off a gurgling sound, and making bubbles on the surface as they are jerked. There are times when these plunking lures are

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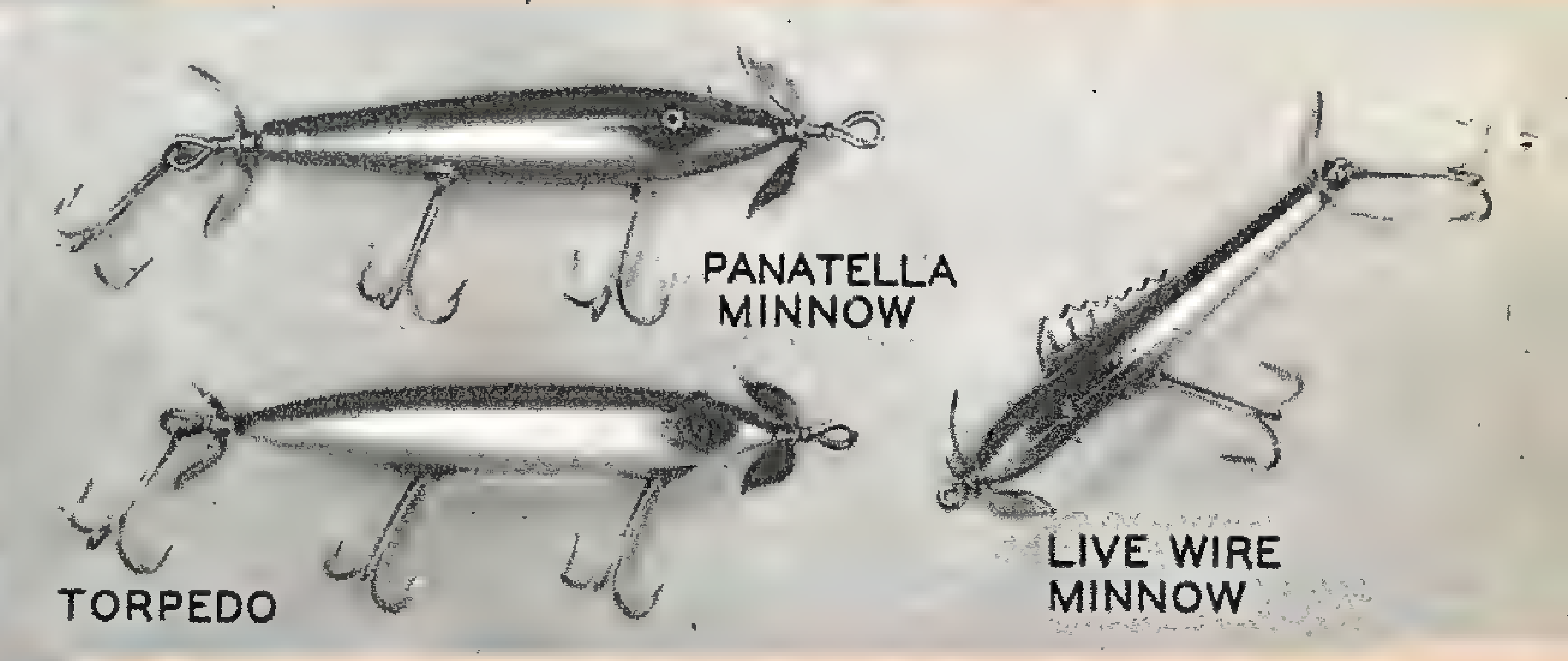

Panatella Minnow is weighted to sink deep. Propellers enhance its attraction value. Torpedo has long slim body believed to be best for holding hard-mouthed fish. Live wire rides right side up. Propellers revolve in opposite directions.

Simplify the Task of FISH CLEANING

by MARVIN SPITTLER

THE smashing strike of a ponderous black-bass, the bent rod, and the singing reel all provide joy to the heart of the ardent fisherman. But, in most cases, the fun ends with catching the fish. After eating the fish, fifty per cent of fishermen complain that their fish are soft and black-veined—that they taste of the slime of the weed beds in which they were caught.

This is true. But the fault is not with the fish; it is with the fisherman. How often does one see a large game fish gasping in the sun to die of suffocation with gaping mouth, glazed eyes and scales curling in the heat.

Fish should be kept alive until the excursion is over and then butchered by placing a sharp knife behind the gill and cutting a slanting gash down to the top of the head to bleed the fish.

When handling live fish, always wet the hands to preserve the scale covering which protects them from death.

The bad taste in fish comes from three sources; the blood, the slime under the scales, and the backbone. The blood, of course, is removed by butchering and the slime and backbone are removed in the cleaning. This method of cleaning fish will do away with the messy business of cleaning up entrails. After cleaning, all that remains is a solid carcass devoid of flesh.

After scaling the fish as shown, remove

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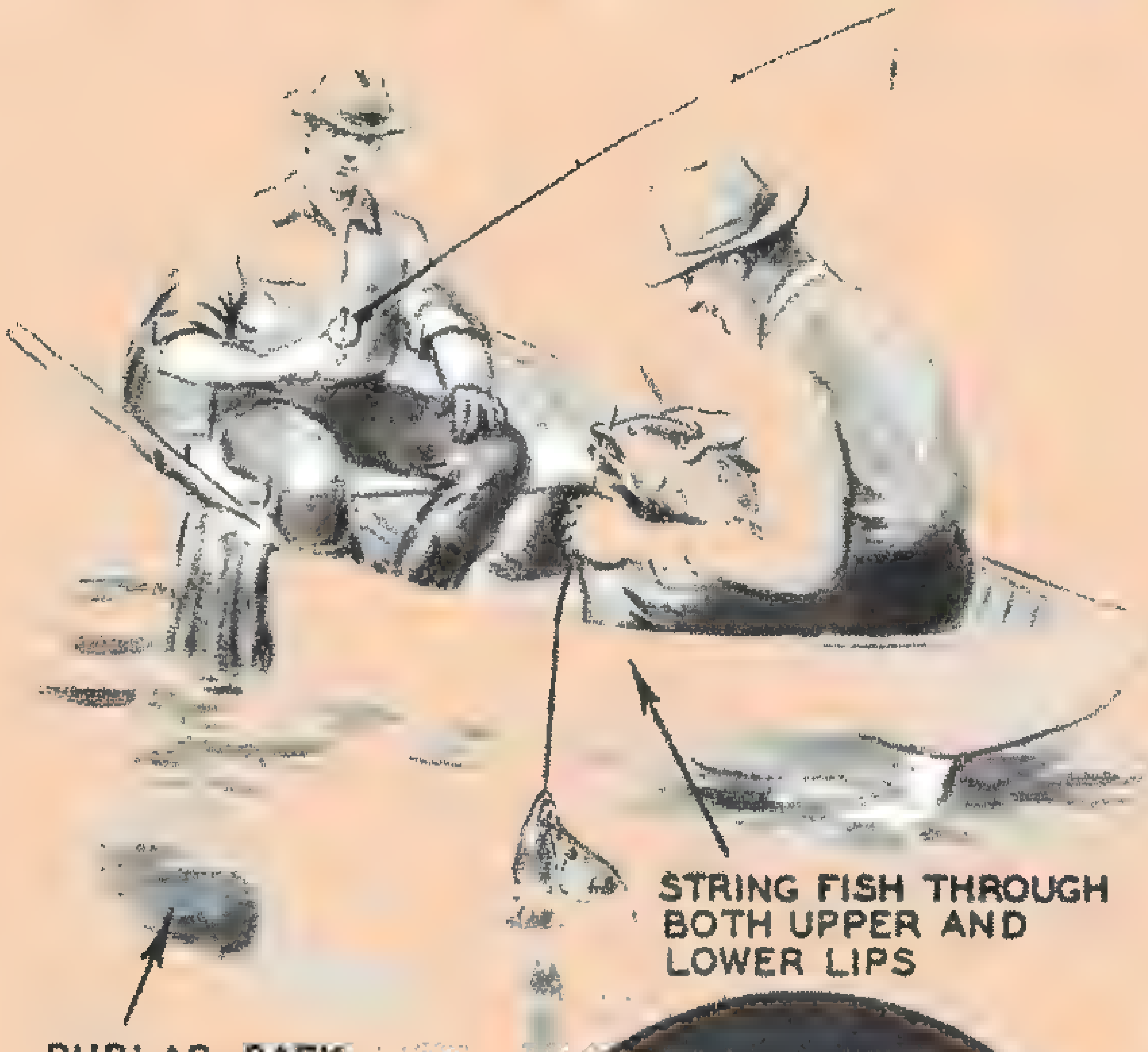
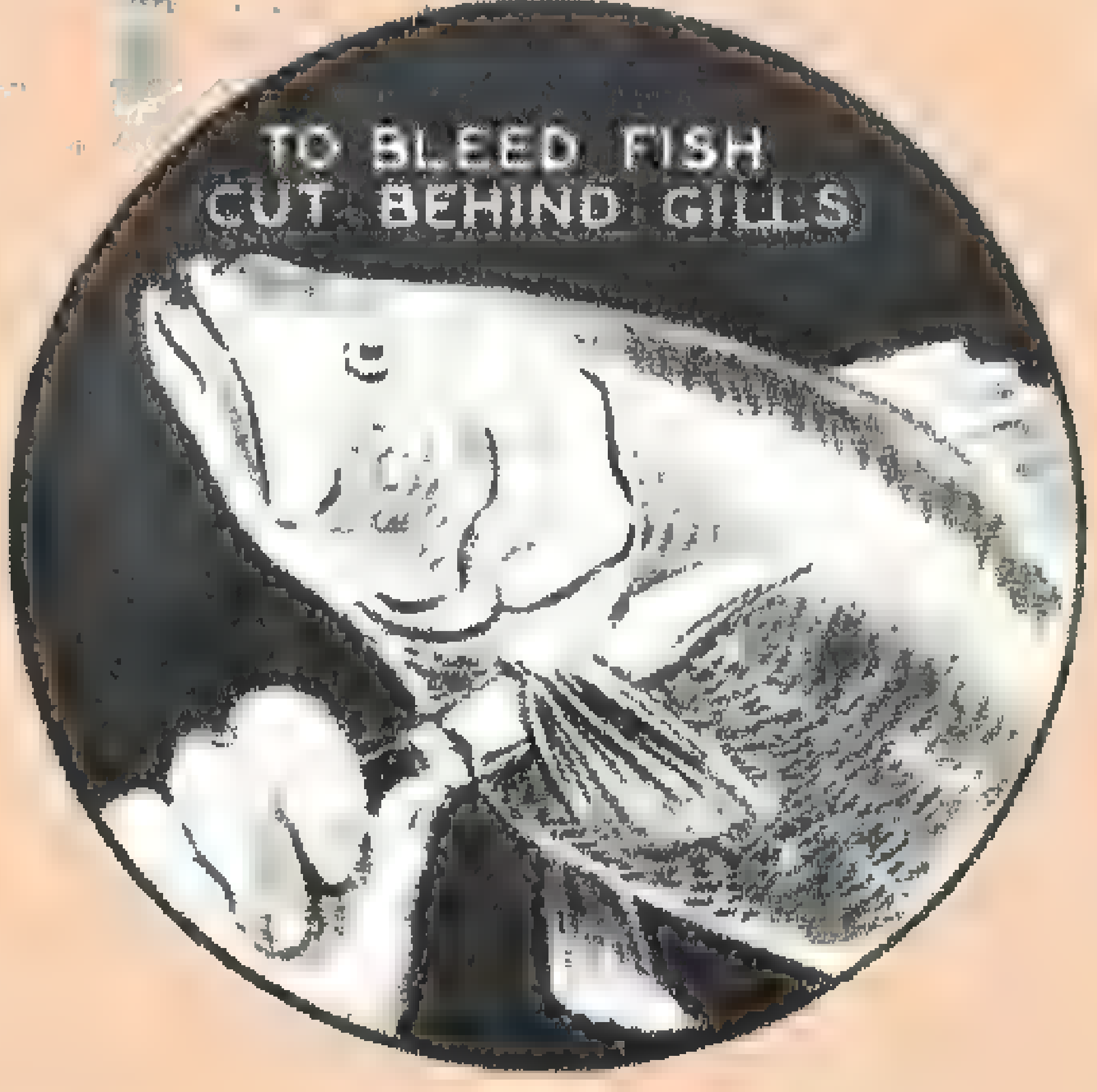
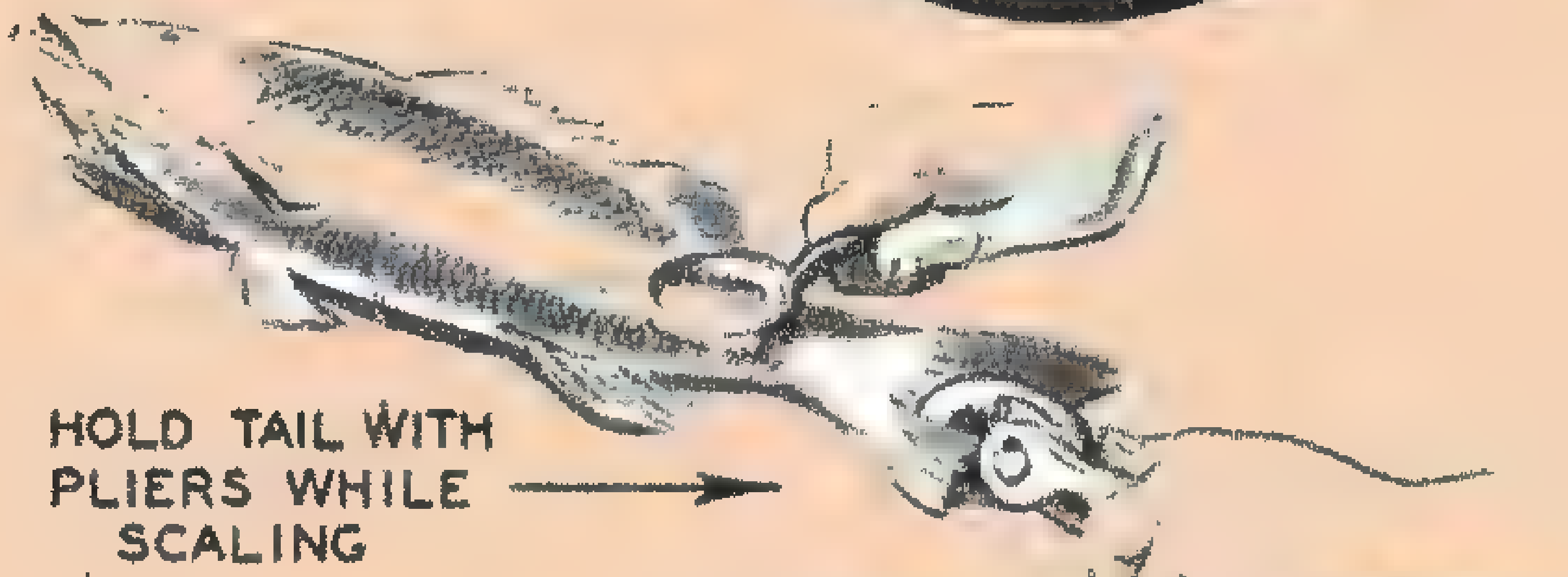
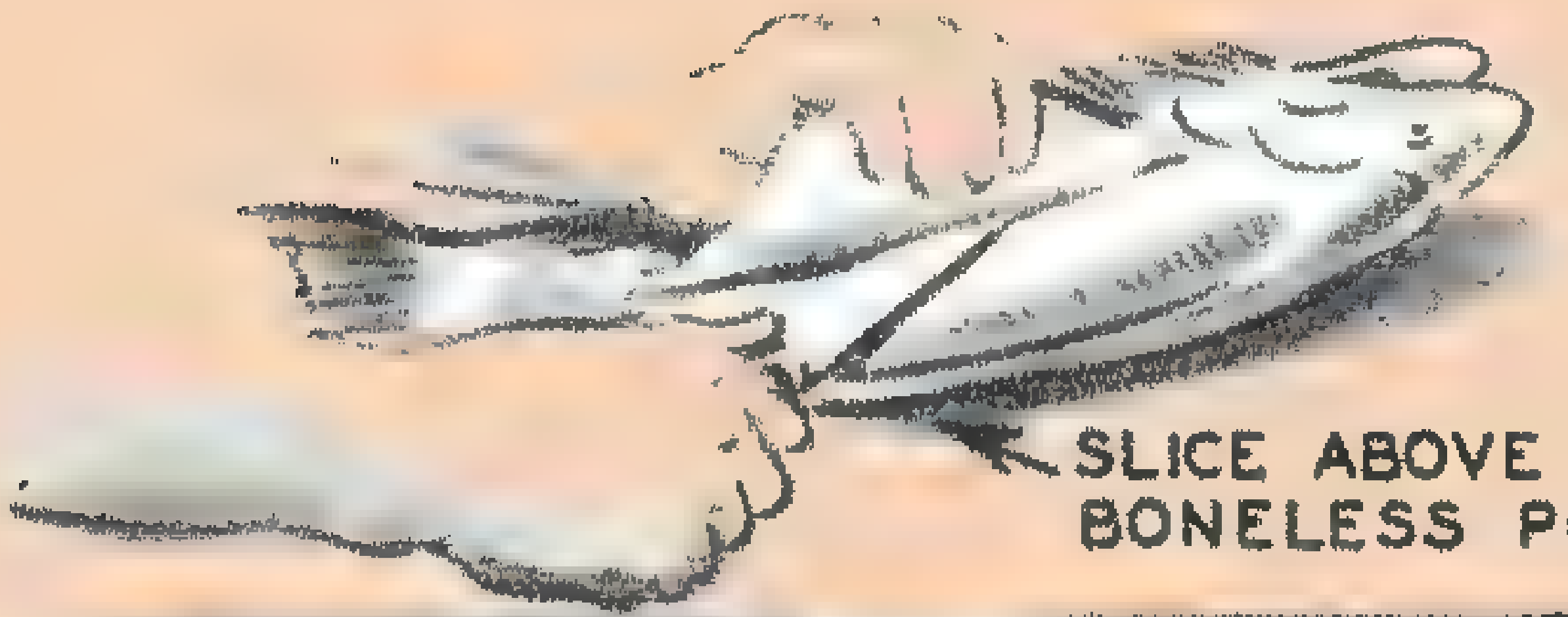
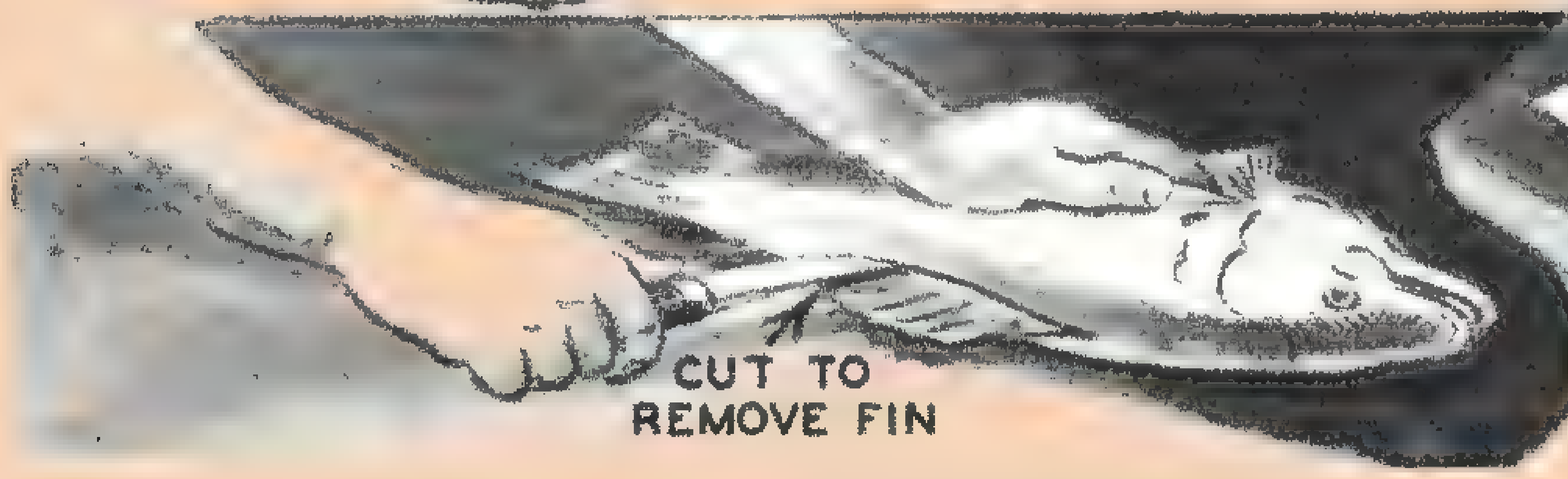

STRING FISH THROUGH BOTH UPPER AND LOWER LIPS
BURLAP SACK


TO BLEED FISH CUT BEHIND GILLS

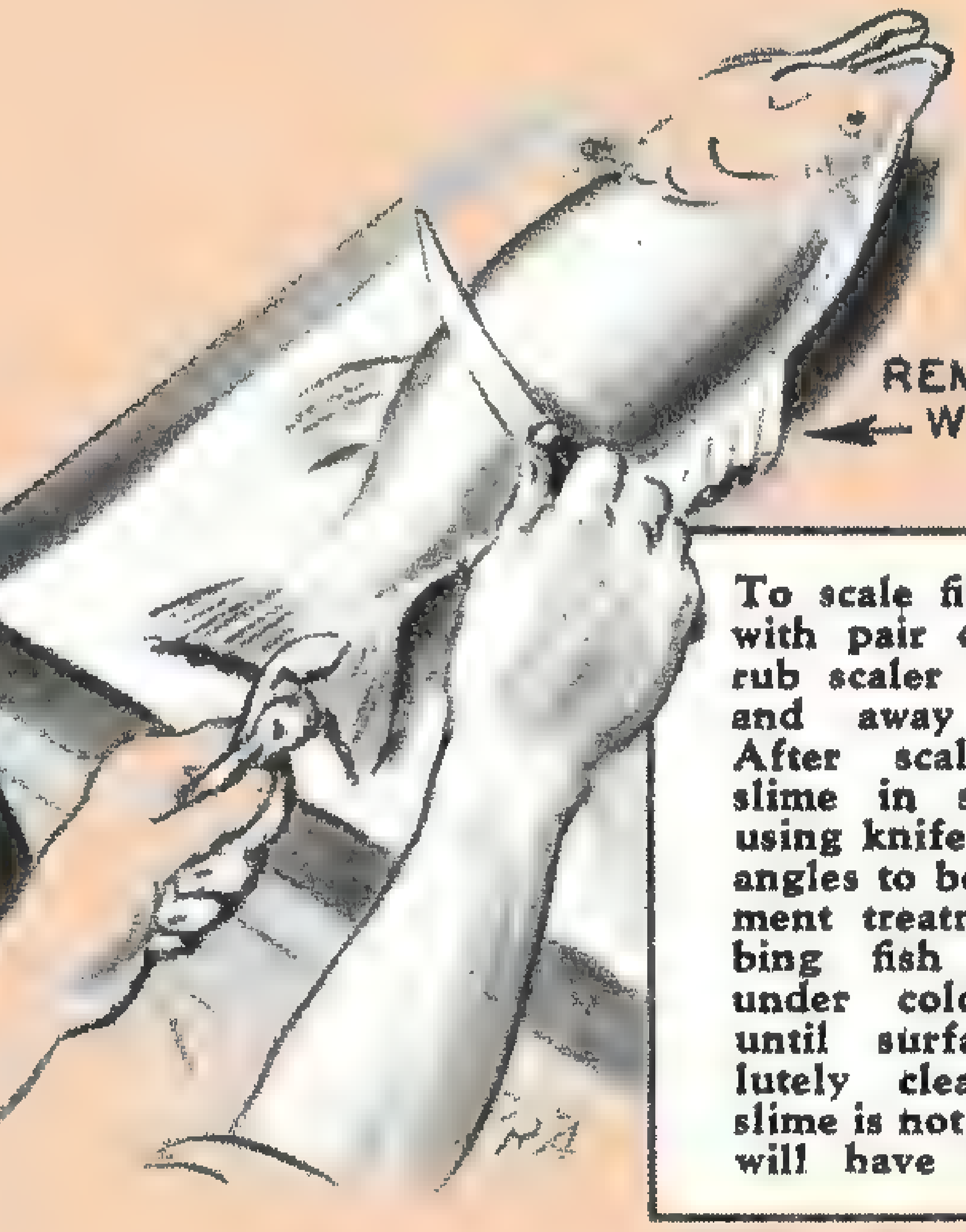
To assure good, tasty fish keep catch alive in burlap sack kept underwater or use a stringer by running it through upper and lower lips to keep fish from drowning. Fishing over, bleed fish to get firm white meat. Wet hands to handle fish.


HOLD TAIL WITH PLIERS WHILE SCALING


SLICE ABOVE RIBS FOR BONELESS PLANKING

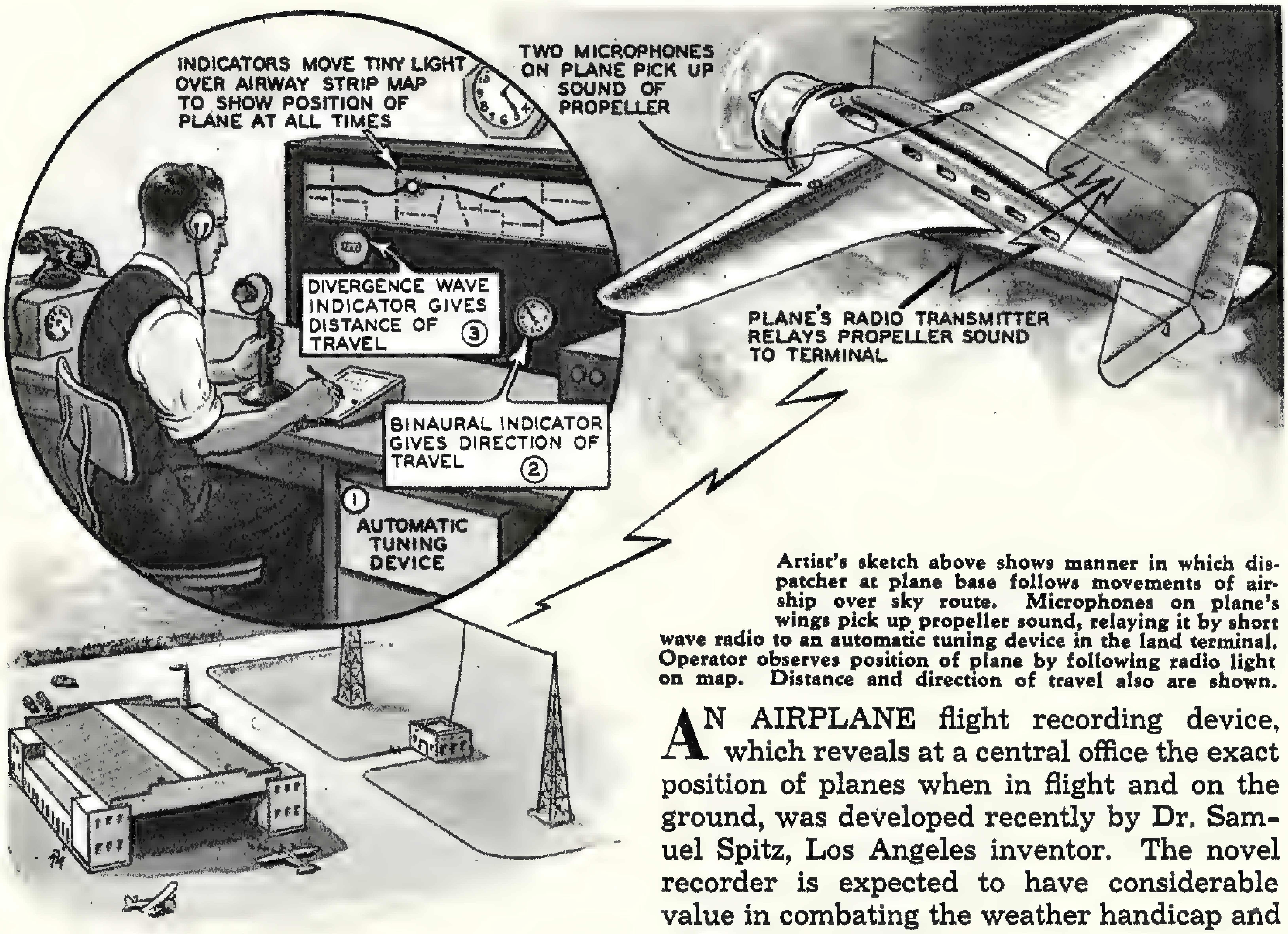


Remove fin by cutting on each side and then pulling it away from flesh. Fish is then ready for planking. Grasp top edge of flesh and pull, cutting away flesh from ribs as you go. Carcass that remains is not messy and can be easily disposed of by burying in ground.



To scale fish, grasp tail with pair of pliers and rub scaler towards head and away from you. After scaling, remove slime in same manner using knife held at right angles to body. Supplement treatment by rubbing fish with hands under cold water tap until surface is absolutely clean. If this slime is not removed, fish will have tainted taste.

Radio Light on Map Traces Plane in Air


INDICATORS MOVE TINY LIGHT OVER AIRWAY STRIP MAP TO SHOW POSITION OF PLANE AT ALL TIMES
TWO MICROPHONES ON PLANE PICK UP SOUND OF PROPELLER
DIVERGENCE WAVE INDICATOR GIVES DISTANCE OF TRAVEL ③
BINAURAL INDICATOR GIVES DIRECTION OF TRAVEL ②
① AUTOMATIC TUNING DEVICE
PLANE'S RADIO TRANSMITTER RELAYS PROPELLER SOUND TO TERMINAL

Artist's sketch above shows manner in which dispatcher at plane base follows movements of airship over sky route. Microphones on plane's wings pick up propeller sound, relaying it by short wave radio to an automatic tuning device in the land terminal. Operator observes position of plane by following radio light on map. Distance and direction of travel also are shown.

AN AIRPLANE flight recording device, which reveals at a central office the exact position of planes when in flight and on the ground, was developed recently by Dr. Samuel Spitz, Los Angeles inventor. The novel recorder is expected to have considerable value in combating the weather handicap and aiding pilots flying blind.

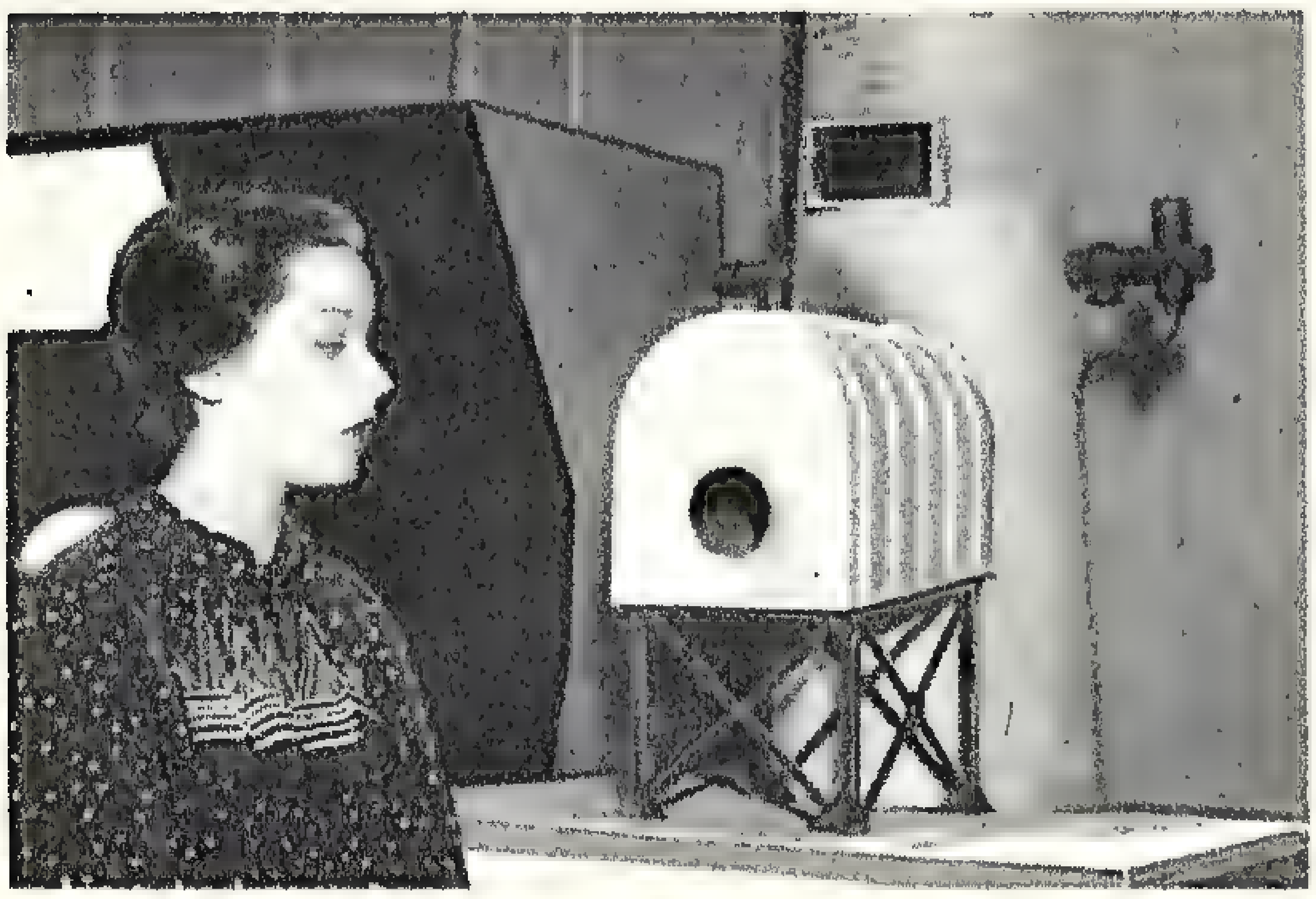
Two small microphones, installed in the wings of the plane, capture the roar of the propeller. Relayed through the plane's radio transmitter, the sound is picked up at the plane terminal or operating base by an automatic tuning device. Here an operator watches a small light, actuated by short wave radio impulses, move across a strip map of the plane's airway route. The position of the light on the map indicates the position of the craft at all times.

A divergence wave indicator, mounted beneath the panelled map, shows at a glance the distance the plane has traveled from its base. Another dial, the binaural indicator, reveals the direction of travel.

If a forced landing is imperative, the dispatcher informs the pilot of the condition of the terrain over which he is passing. When the landing is made, the light indicator on the map continues to burn so that the operator can dispatch immediate aid to the point of landing. Air transport companies operating several planes may record each individual flight by installing more variable condensers in the tuning device.

Electric Eye Detects Fuel Waste

WASTED fuel is impossible when smokestacks are equipped with an "electric eye" to aid the fireman. When the chimney begins to smoke, a photo-electric cell mounted near the base of the stack sends out a warning. Commercial use of the electric eye for this purpose was demonstrated in Chicago.

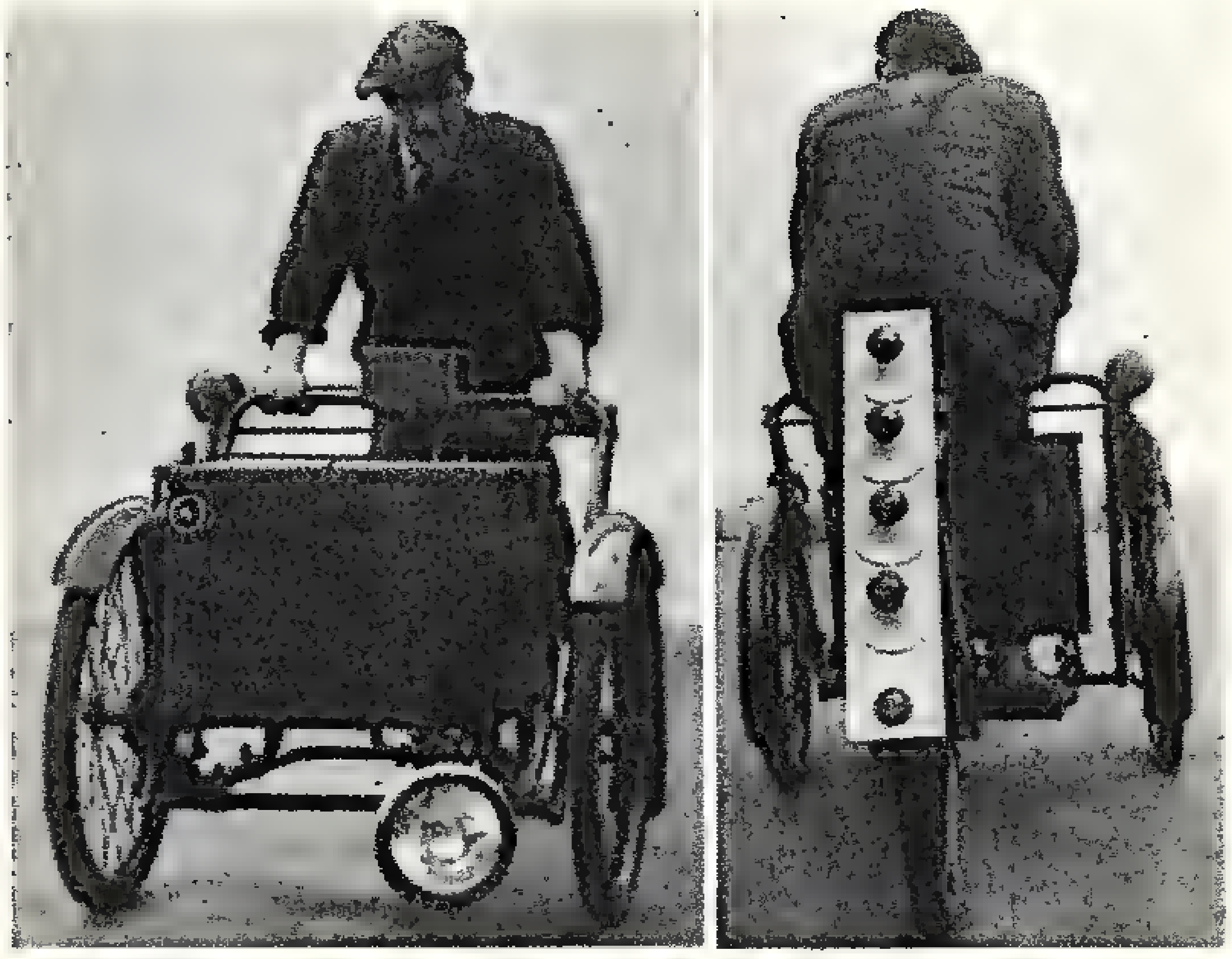


A model of a factory smoke-stack equipped with an electric eye is shown above. When the chimney smokes, a photoelectric cell quickly detects fuel waste and warns fireman.

Signalling Tricycles Pilot Busses Through English Fog

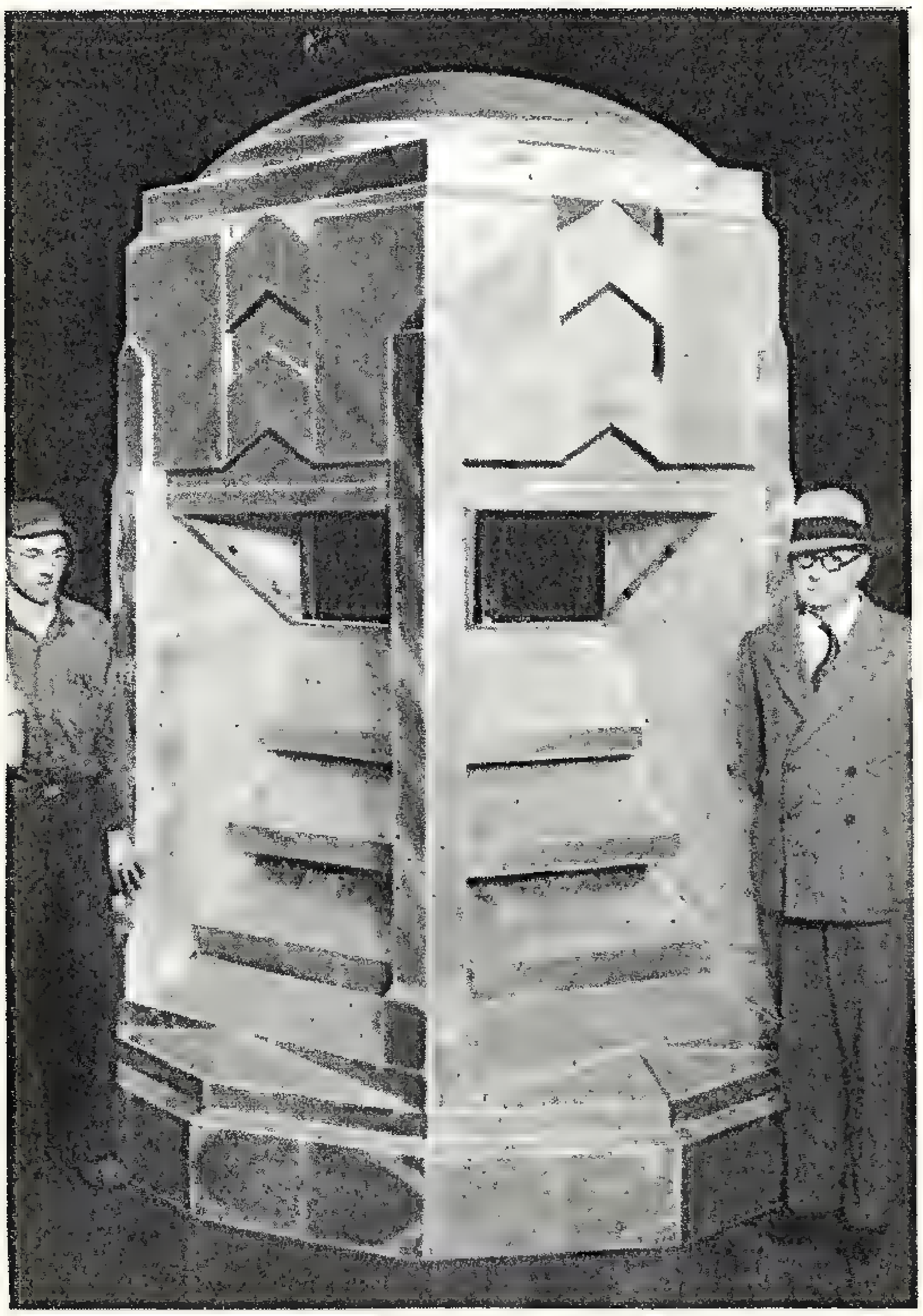
LIKE the pilot-fish which swims ahead of ships and sharks in search of food, England's recently introduced signal-clad tricycles guide passenger busses through Manchester's foggy streets.

The new "fog-cycle," which can be powered by one man, has two wheels in the front and one in the rear. A square box is mounted over the front axle and contains batteries for operating the signal lights. A large fog lamp illuminates the road ahead, while a series of five smaller lamps mounted on a panel over the rear mud guard of the tricycle is used to signal the bus driver who follows close behind.



Tricycles equipped with pilot lamps escort Manchester busses in fog. Cyclist rides ahead of bus, flashing lamps to warn driver. Photos show front and rear of vehicle.

Huge Lanterns Light Boulder Dam



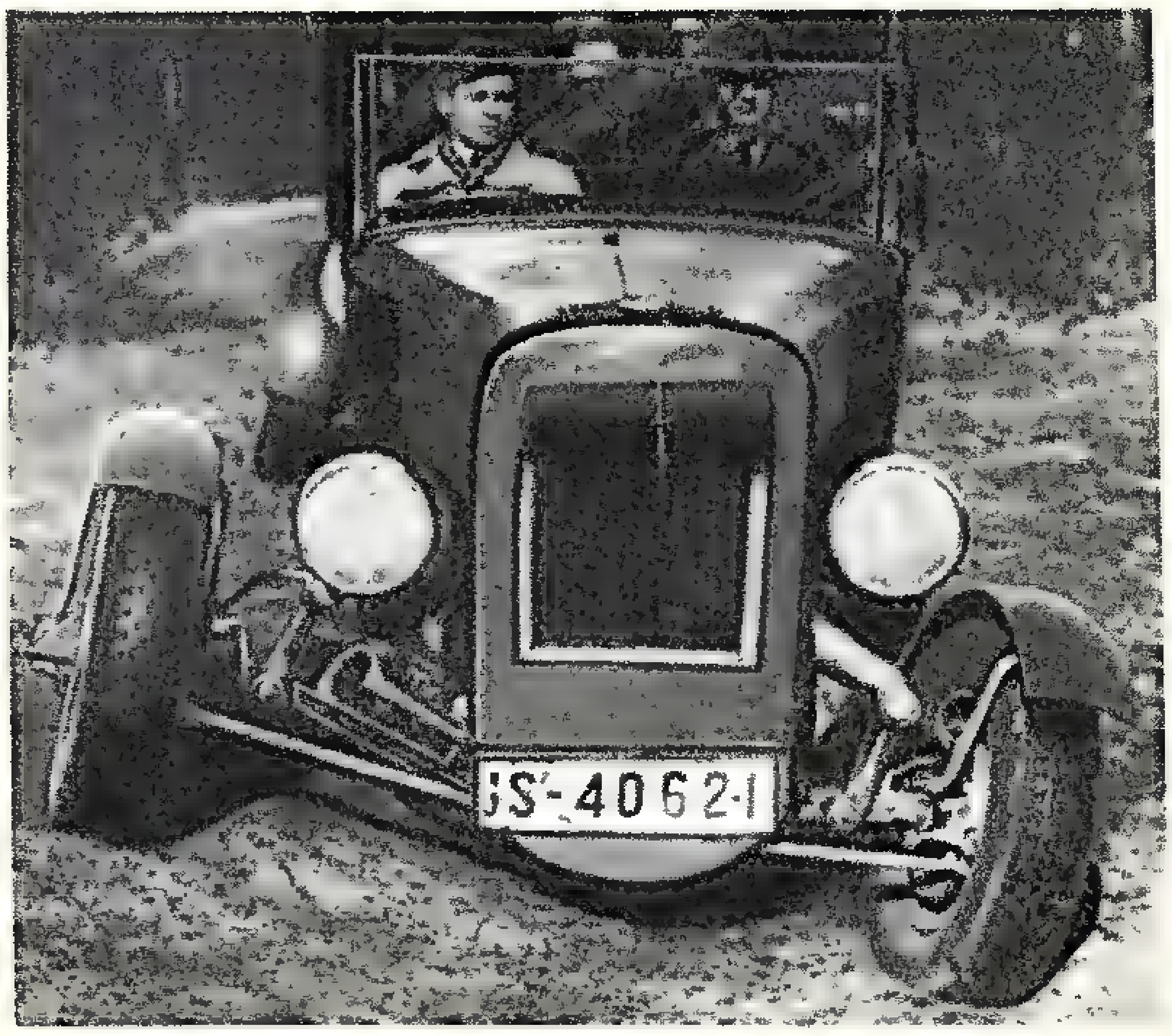
Here is one of the four immense lanterns which are being installed on Boulder Dam's intake towers. Modernistic in shape, each lantern required 1,500 lbs. of metal in its construction.

BELIEVED to be the largest of their kind in the world, four giant lanterns, almost twice the height of a man, are being installed to illuminate the intake towers of Boulder Dam. Composed of an aluminum-copper-silicon alloy, each lantern required 68 separate castings from 12 different patterns. Each lantern contains six 300-watt flood lights.

Curve-Balancer Stabilizes Car

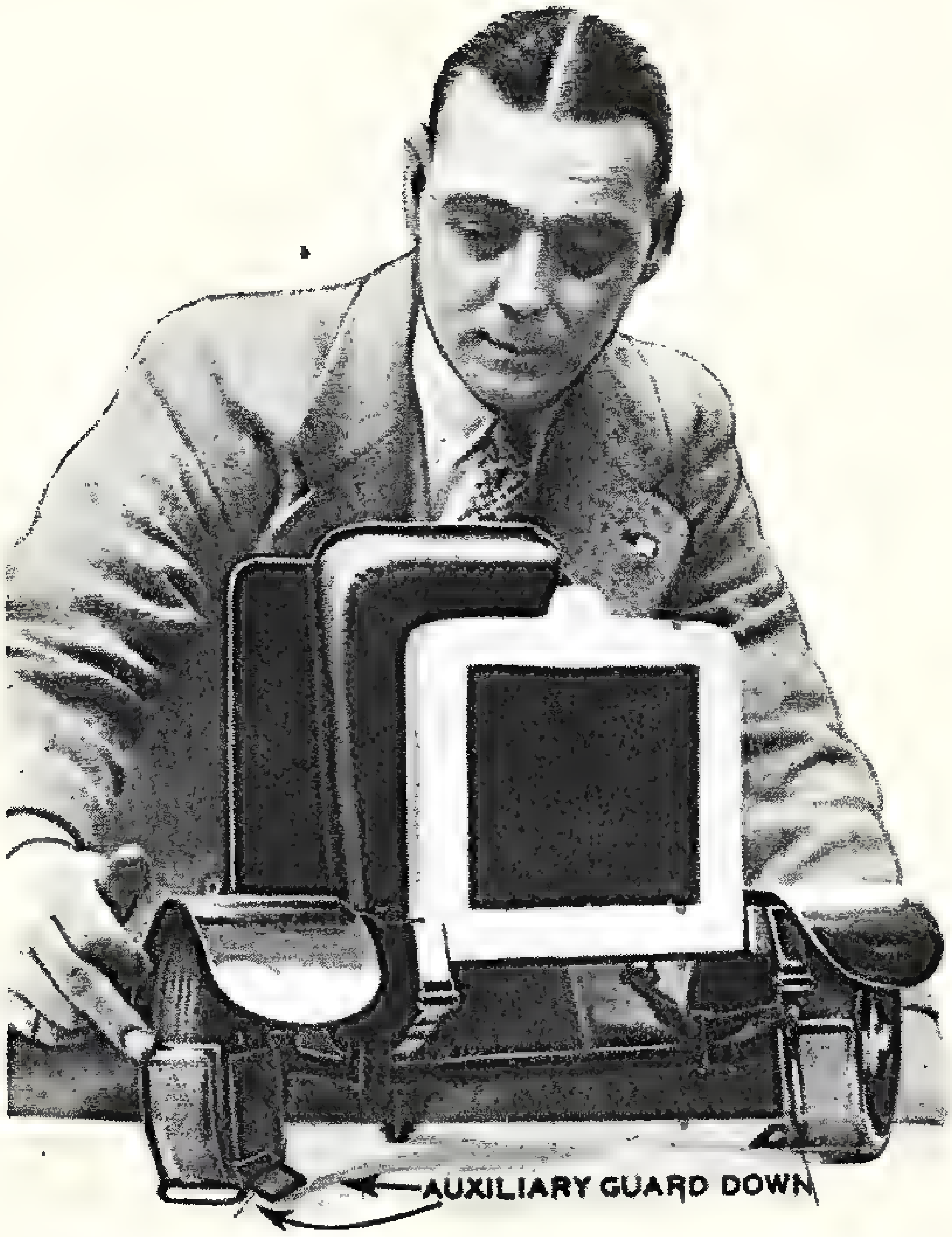
TO KEEP automobiles on an even keel when rounding curves or traveling over bumpy roads, a "curve-balancer" has been devised by a German inventor.

The device keeps the body of the car in a vertical position when driven over road surfaces which would cause the ordinary car to sway or tilt. Resembling America's "knee-action" vehicles, the wheels of the German car move up and down not only independent of each other but of the entire chassis. In this way the wheel can pass over a bump or drop into a hole without revealing any irregularity to passenger or driver. Mechanical elbow joints permit the wheels to move freely.



Swaying or tilting when driving around curves or over bumpy roads is claimed to be eliminated with this "curve-balancer." Metal elbows allow independent movement of the wheels.

Guard Saves Pedestrian in Auto Accidents



W. J. Atkins of England is seen with a model of his wheel guard. If wheel strikes pedestrian, auxiliary guards drop.

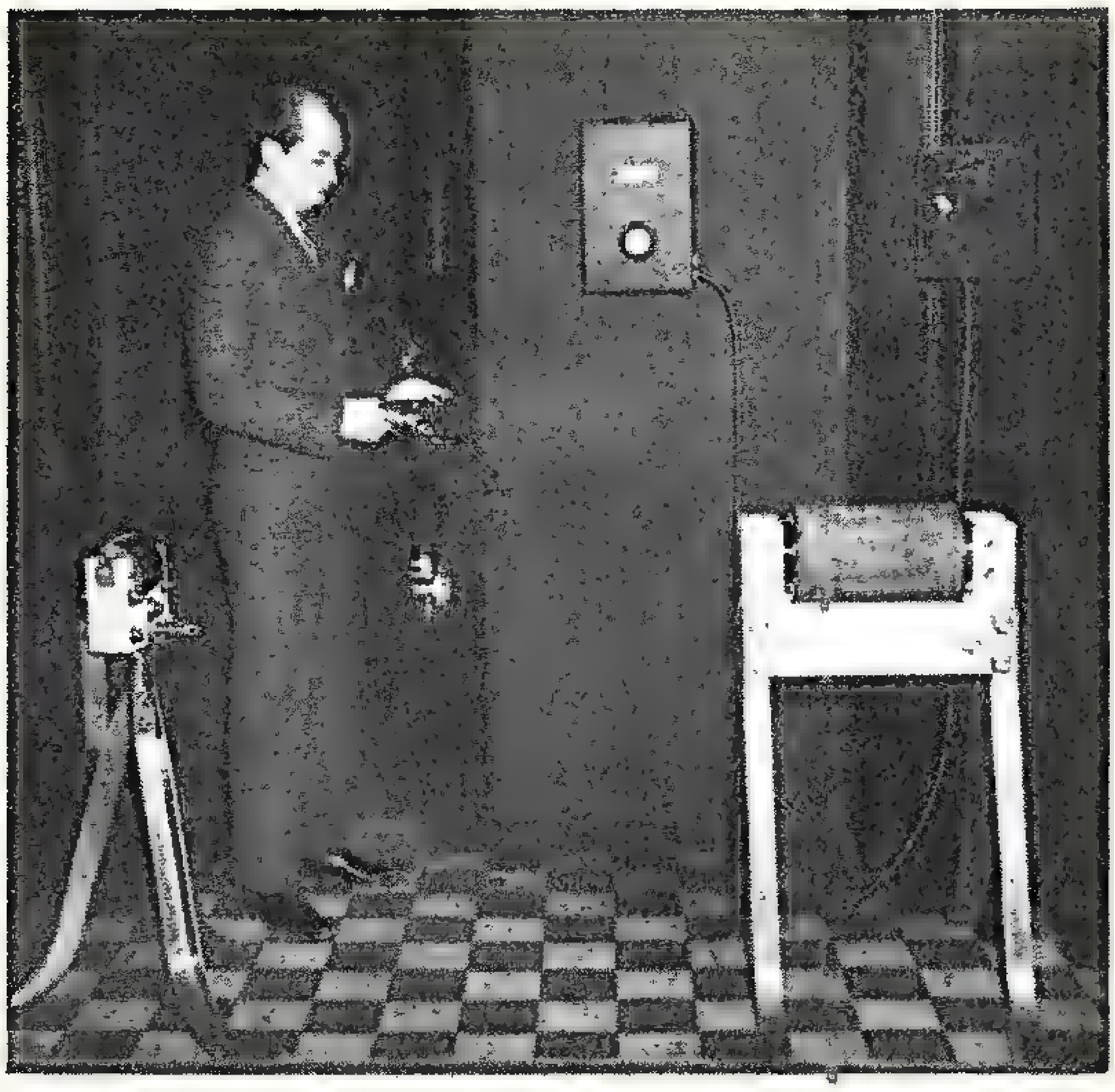
A "PEDESTRIAN-GUARD" for motor vehicles, miniature resemblance of the cow-catcher of a locomotive, has been devised by an English auto engineer. With the use of his new device, the inventor claims that serious pedestrian injuries and losses of life will be prevented.

The wheel guards consist of rolled steel frameworks covered with mesh. These are mounted directly ahead of each front wheel and are clamped to the stub axle.

If a pedestrian is struck by the curved panel in front of either wheel, a strong spring releases two auxiliary guards nearer the ground. These prevent the wheels from passing over the pedestrian before the car can be stopped.

Magnets Detect Smuggled Weapons

SMUGGLING of weapons into prisons is eliminated by the new secret weapon detector. As soon as a person with a gun passes between twin electric magnets mounted on stands, a light and buzzer issue warnings.



If a carrier of concealed firearms walks between magnets at jail door, a light and buzzer give warning signal to keeper.

Road Reflector Aids Car Parking

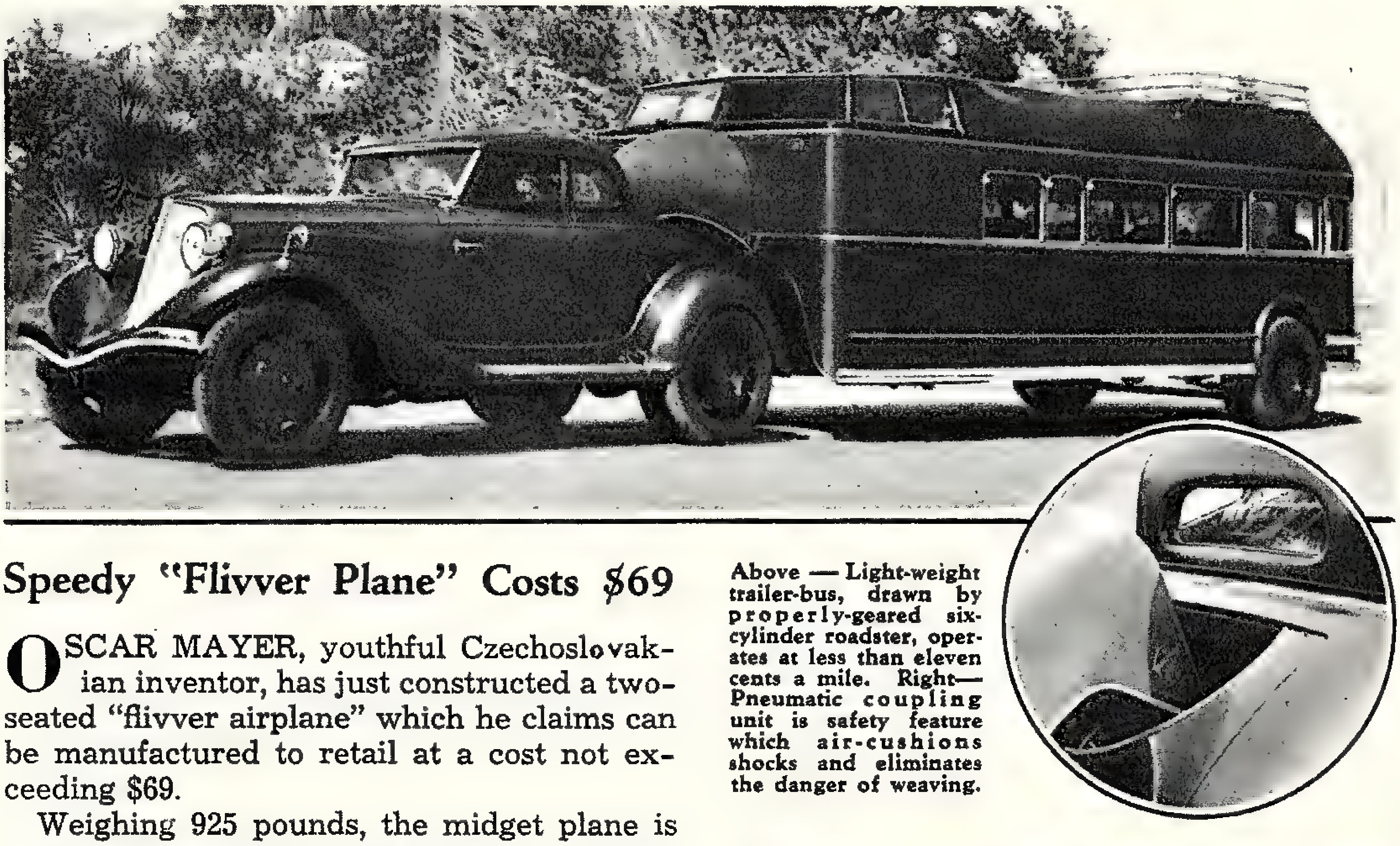
SIGN ON PAVEMENT
FT. BACK OF AUTO
TEN FEET WIDE

By means of new rear window reflector, image of a sign six by ten feet placed on the road two feet back of the car was reflected into rear view mirror over windshield to show parking advantages of new road-reflecting mirror for motorists.

THE motorist's latest aid in simplifying his parking problems is a curved reflector for the rear window which eliminates the blind spots back of the car. The reflector casts an image into the conventional rear view mirror above the windshield.

With this device, the driver can see everything within an area two to eight feet back of the car and ten feet wide. The driver can clearly see how close the automobile is to the curb when backing into a parking space and can see the front bumper of the car back of him until he gets within two feet of it. In traffic the reflector shows cars approaching from the side or rear. The reflector fastens to the rear window with a suction cup.

Pneumatic Coupler Connects 26-Passenger Trailer to Auto



Above — Light-weight trailer-bus, drawn by properly-geared six-cylinder roadster, operates at less than eleven cents a mile. Right—Pneumatic coupling unit is safety feature which air-cushions shocks and eliminates the danger of weaving.

A NEW, revolutionary type of trailer, which combines all standardized features of aviation and automobile construction known to science, has just been put into service.

Attached to an ordinary six-cylinder roadster by a pneumatic coupling unit, the 26-passenger bus when loaded can be driven at an operating cost of under eleven cents a mile or little more than the cost of running a two-passenger, six-cylinder car. The body and chassis are built as a single unit. Airplane struts and longerons constitute the frame which is tightened by crosswire braces. A novel airplane "cockpit" seats four people. The coupler insures safety and absorbs power-car vibrations and road shocks.

Speedy "Flivver Plane" Costs $69

OSCAR MAYER, youthful Czechoslovakian inventor, has just constructed a two-seated "flivver airplane" which he claims can be manufactured to retail at a cost not exceeding $69.

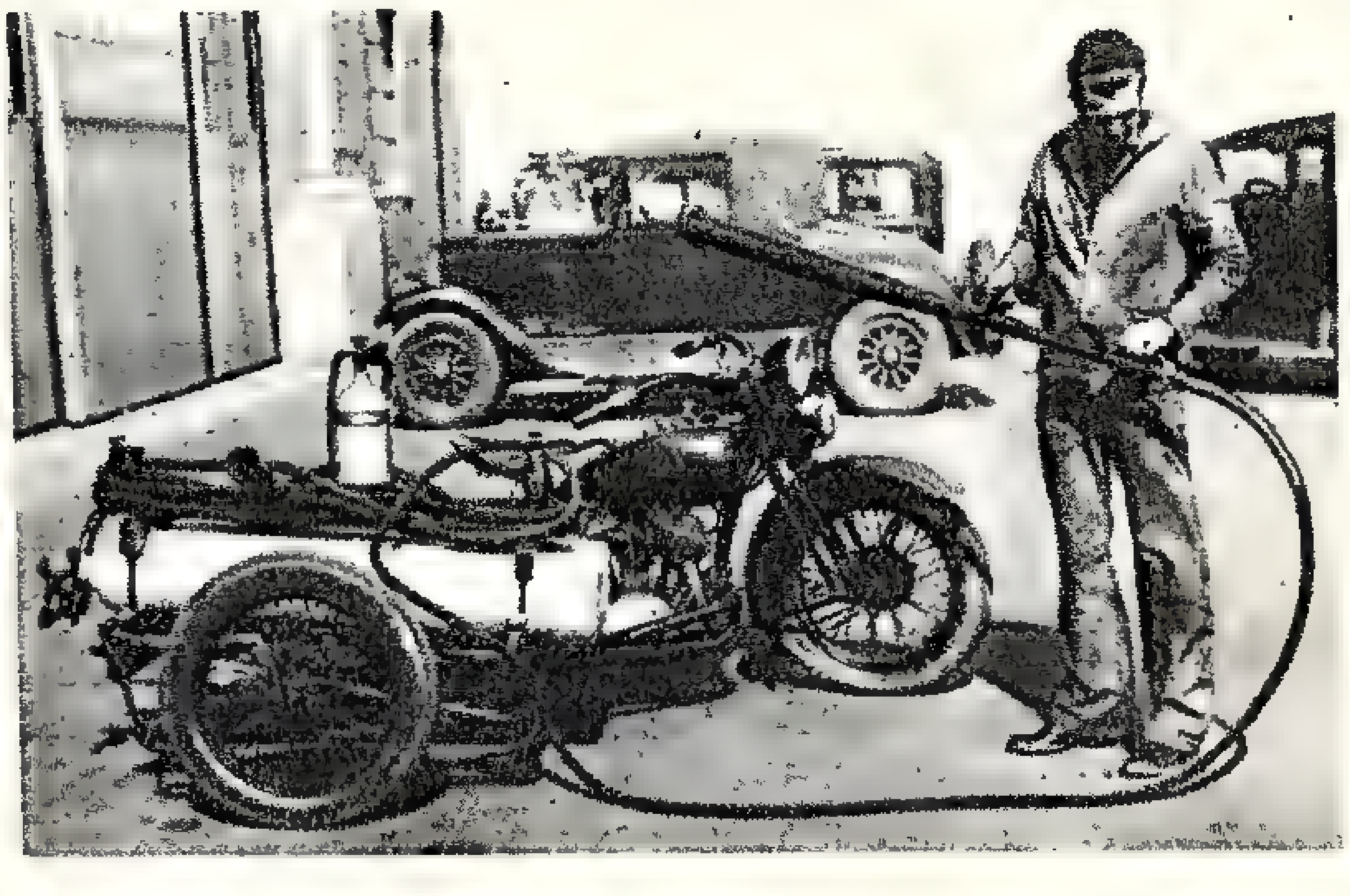
Weighing 925 pounds, the midget plane is 16 feet long and has a wing spread of 33 feet. It consumes less than four gallons of fuel for every 100 miles of travel and is said to attain a speed of 75 m.p.h.

Inventor Oscar Mayer, of Prague, is seen at left with his 75 m.p.h., low-cost "flivver" plane.

Airport Fireman Uses Motorcycle

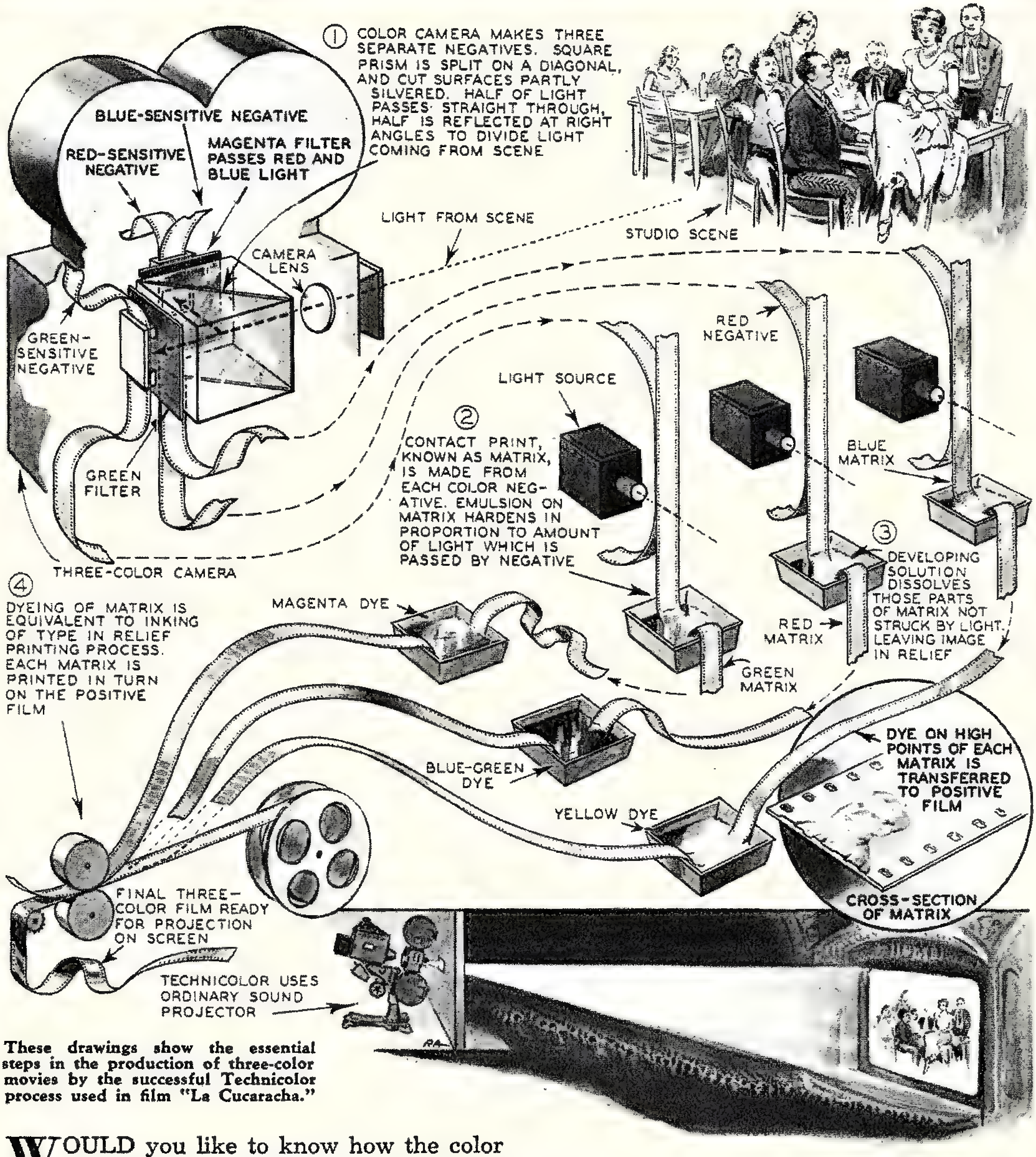
BURNING planes can be put out quickly with the new navy fire extinguisher which is now being introduced at many of America's larger airports.

The apparatus is compact and may be carried about on a three-wheeled motorcycle. If an airplane lands in flames, the motorcycle fireman dashes swiftly to the scene, unrolls the rubber tubing, directs the nozzle on the blaze, and sprays the chemical over the burning plane for a rapid put-out.



This unique fire extinguisher is used to smother plane flames at airports. Chemicals and hose are mounted on a three-wheeled motorcycle and rushed quickly to the scene.

How THREE COLOR MOVIES


① COLOR CAMERA MAKES THREE SEPARATE NEGATIVES. SQUARE PRISM IS SPLIT ON A DIAGONAL, AND CUT SURFACES PARTLY SILVERED. HALF OF LIGHT PASSES STRAIGHT THROUGH, HALF IS REFLECTED AT RIGHT ANGLES TO DIVIDE LIGHT COMING FROM SCENE
BLUE-SENSITIVE NEGATIVE
RED-SENSITIVE NEGATIVE
MAGENTA FILTER PASSES RED AND BLUE LIGHT
LIGHT FROM SCENE
STUDIO SCENE
CAMERA LENS
GREEN-SENSITIVE NEGATIVE
GREEN FILTER
THREE-COLOR CAMERA
RED NEGATIVE
LIGHT SOURCE
② CONTACT PRINT, KNOWN AS MATRIX, IS MADE FROM EACH COLOR NEGATIVE. EMULSION ON MATRIX HARDENS IN PROPORTION TO AMOUNT OF LIGHT WHICH IS PASSED BY NEGATIVE
BLUE MATRIX
③ DEVELOPING SOLUTION DISSOLVES THOSE PARTS OF MATRIX NOT STRUCK BY LIGHT, LEAVING IMAGE IN RELIEF
RED MATRIX
GREEN MATRIX
④ DYEING OF MATRIX IS EQUIVALENT TO INKING OF TYPE IN RELIEF PRINTING PROCESS. EACH MATRIX IS PRINTED IN TURN ON THE POSITIVE FILM
MAGENTA DYE
BLUE-GREEN DYE
YELLOW DYE
DYE ON HIGH POINTS OF EACH MATRIX IS TRANSFERRED TO POSITIVE FILM
CROSS-SECTION OF MATRIX
FINAL THREE-COLOR FILM READY FOR PROJECTION ON SCREEN
TECHNICOLOR USES ORDINARY SOUND PROJECTOR

These drawings show the essential steps in the production of three-color movies by the successful Technicolor process used in film "La Cucaracha."

WOULD you like to know how the color in a Walt Disney Silly Symphony or in "La Cucaracha" is obtained? Have you ever wondered how a motion picture film, in which each picture is about the size of a postage stamp, is colored so it can be magnified 35,000 or more times and still retain the beautiful coloring of a Silly Symphony?

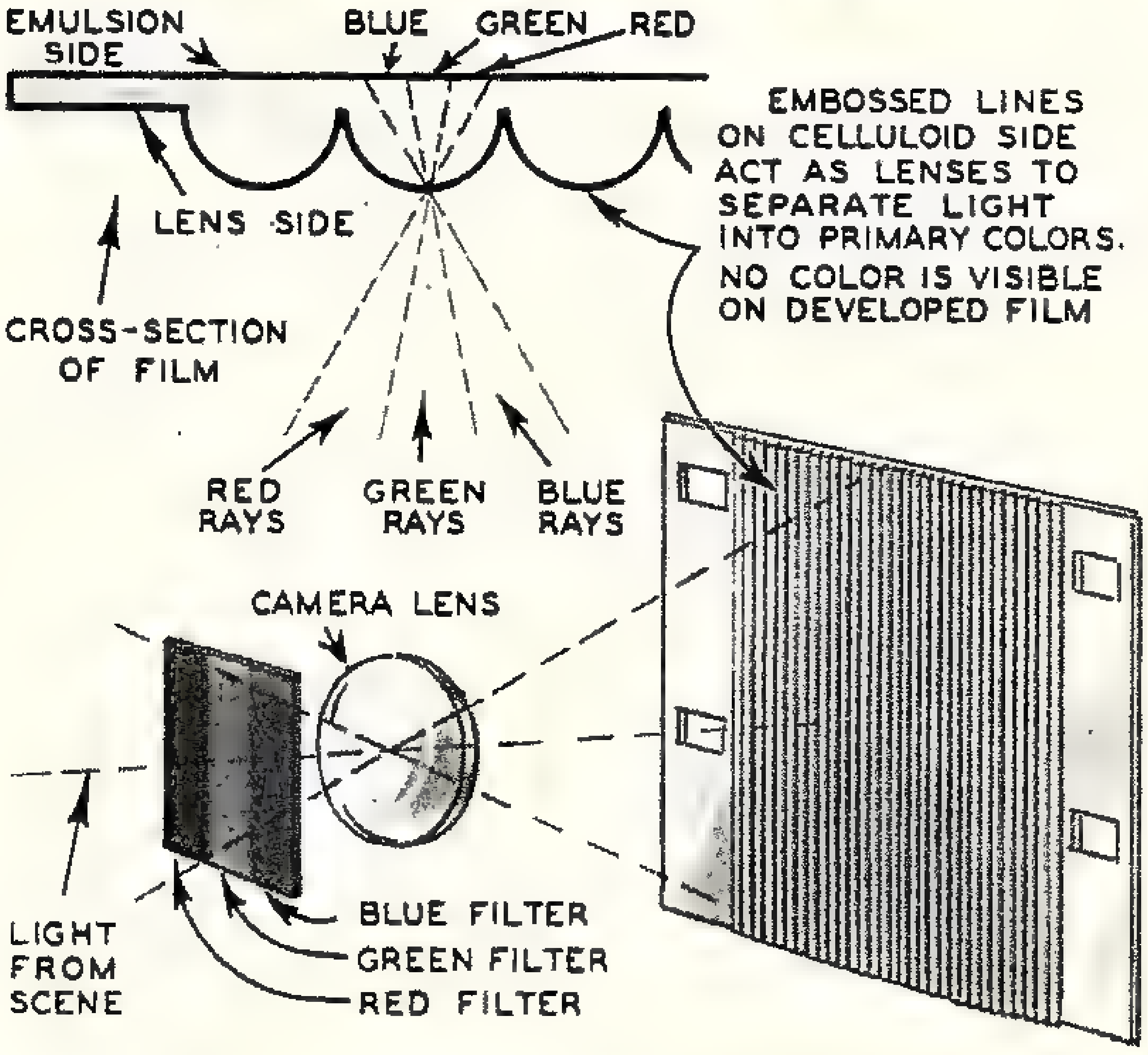
The actual application of the color to the film is not unlike the method used in printing a page of type. In the printing process, the type is set or a plate is made for each of the colors appearing in the picture or the printed page.

The plates or type of a printing press are in relief and the high portions of the plate receive an ink which is pressed into contact with the paper. The ink is transferred to the paper. In the motion picture, they do not use plates in that sense of the word. Instead, a "matrix" is used. This "matrix" is very similar to the

ARE MADE

by EARL THEISEN

One of the frames from "La Cucaracha," a two-reel short which is proving to be the first notably successful color picture other than the three-color animated cartoons. Note the variable-density sound track at the left of the picture.


EMULSION SIDE
BLUE
GREEN
RED
EMBOSSED LINES ON CELLULOID SIDE ACT AS LENSES TO SEPARATE LIGHT INTO PRIMARY COLORS. NO COLOR IS VISIBLE ON DEVELOPED FILM
LENS SIDE
CROSS-SECTION OF FILM
RED RAYS
GREEN RAYS
BLUE RAYS
CAMERA LENS
LIGHT FROM SCENE
BLUE FILTER
GREEN FILTER
RED FILTER

Lenses embossed in film provide color separation in Kodacolor process developed by Eastman Kodak to give color movies to amateur movie fans using 16 millimeter film. Both camera and projector must have the special three-color filter, since finished Kodacolor film shows no color.

printer's type or plate, and the color impression is made by dyeing the "matrix" and pressing it in contact with a motion picture film.

In a picture on paper, if the finished print shows three colors, three separate plates have to be made and the paper run through the press three times. In the same way a motion picture receives a printing, or an "imbibition," as it is known in the studios, for each color that appears on the screen.

Until the perfection of the Technicolor Three-Color process, which was first used in the Disney cartoons, all motion pictures were colored in only two colors; namely, red-orange and green-blue. Of course the use of only two colors resulted in a limited color range. Now, however, with the perfection of a method of applying three colors, a more natural and true to life color on the screen is possible. This was brought about through the enterprise of Dr. Herbert T. Kalmus.

The Technicolor Three-Color process is the nearest approach to the colors and delicate shades found in nature. It was perfected for Technicolor under the supervision of J. A. Ball, and was first commercially used in 1932 in the Walt Disney Silly Symphony, "Flowers and Trees." The same process was first used in a real-life picture, "The House of Rothschild," in a color sequence supervised by Natalie Kalmus. It was also used in "La Cucaracha," a two-reel short which has taken the country by storm because of its beautiful color. Financed by John H. Whitney at a cost of $65,000, which is over three times the cost of an uncolored picture of the same length, this is proving to be the first notably successful color film outside of the cartoons.

In photographing a Disney Silly Symphony,

[*Continued on page* 122]

"Talkies" Heard Through Bones In First Theater for Deaf

Dr. Hugo Lieber, of New York, demonstrates how pressure of his new "oscillator" on any head bone permits the deaf to hear "talkies." A Chicago show house uses the device.

WHAT is claimed to be the only theater in the world offering talking picture entertainment for the deaf is now operating in Chicago.

Hearing is made possible by an "oscillator" which literally enables the hard-of-hearing to "listen" through their bones. Every seat in the Chicago theater is equipped with the new device. Devised by Dr. Hugo Lieber, of New York, the unusual instrument is no larger than a sugar lump. It is attached to the end of a lorgnette handle and can easily be hidden in the palm of the hand. Pressure of the oscillator against any bone of the skull permits the sound waves to travel through the bony structure of the body to the middle ear. A tiny rheostat on the connecting cord regulates volume in proportion to the listener's deafness.

Those of sound hearing also may attend the theater and are in no way annoyed by the operation of the oscillator. There are no loud or discordant noises to distract those with normal hearing.

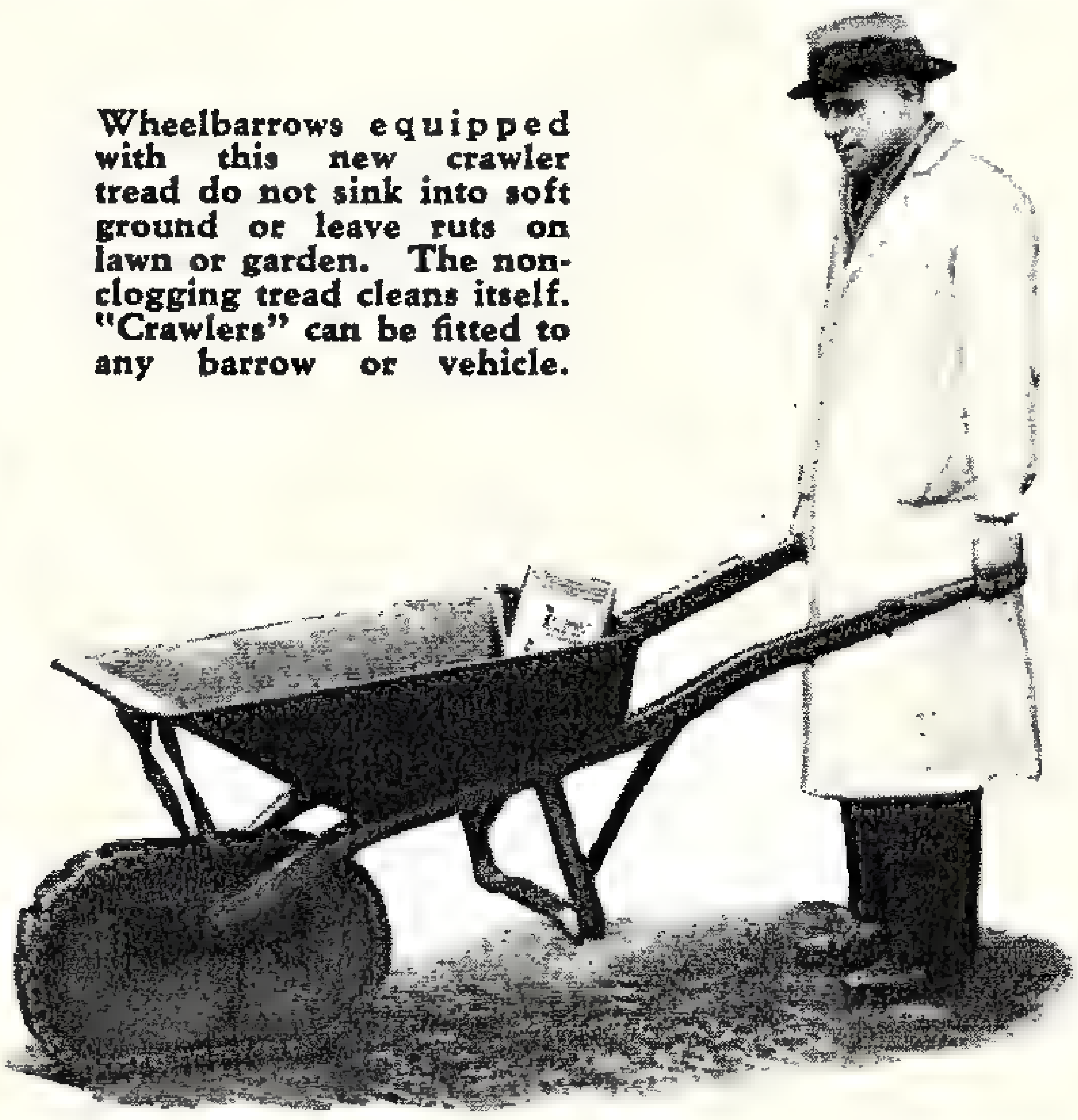
Makes Baskets from Pine Needles

BEAUTIFULLY designed baskets, rivaling the craftsmanship of Indian basket makers, are produced from pine needles and plant fiber as the leisure-time hobby of Mrs. Alice P. Hooker, of Balboa Island, California.

Selected needles are boiled to remove pitch, thoroughly dried and treated to prevent them from becoming brittle. Nearly half a day is required to gather enough pine needles for one basket. One of the finest designs took three months to complete. Some baskets are so tightly woven that they will hold water.

As many as 5,000 pine needles are used by this California woman in weaving one basket. Bundle of needles is at her feet.

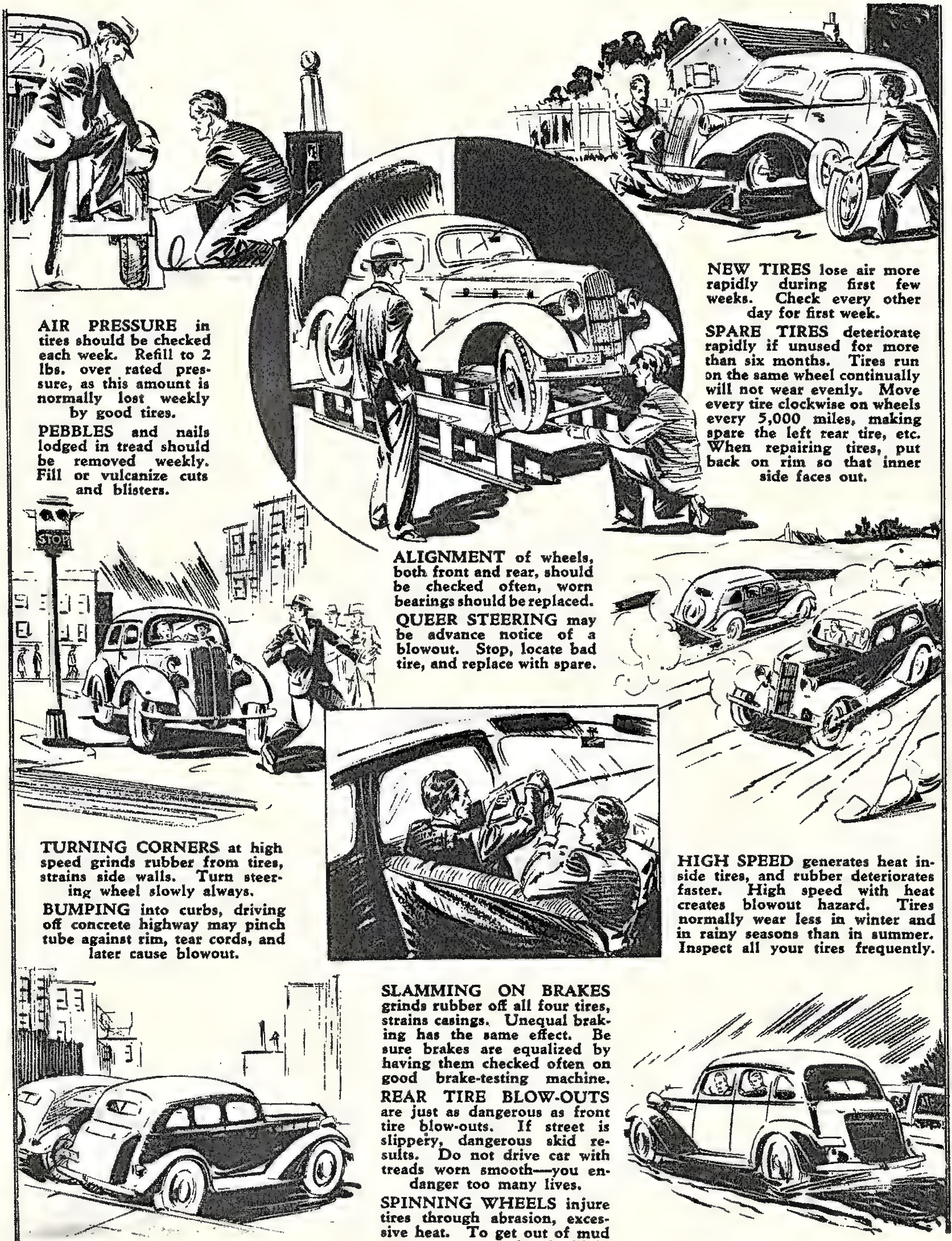
Barrow With Tread Is Trackless



Wheelbarrows equipped with this new crawler tread do not sink into soft ground or leave ruts on lawn or garden. The non-clogging tread cleans itself. "Crawlers" can be fitted to any barrow or vehicle.

CATERPILLAR treads which can be fitted to garden wheelbarrows are being introduced by a German manufacturer. The new "crawler-barrows" have an advantage over the old single-wheelers since the new vehicle can pass unhindered over soft and sandy soil, thus eliminating the necessity of laying down planks. The barrow is claimed to wheel easily without leaving tracks or ruts on lawns or garden beds.

12 Rules to Avoid Blow-Outs



AIR PRESSURE in tires should be checked each week. Refill to 2 lbs. over rated pressure, as this amount is normally lost weekly by good tires.

PEBBLES and nails lodged in tread should be removed weekly. Fill or vulcanize cuts and blisters.

NEW TIRES lose air more rapidly during first few weeks. Check every other day for first week.

SPARE TIRES deteriorate rapidly if unused for more than six months. Tires run on the same wheel continually will not wear evenly. Move every tire clockwise on wheels every 5,000 miles, making spare the left rear tire, etc. When repairing tires, put back on rim so that inner side faces out.

ALIGNMENT of wheels, both front and rear, should be checked often, worn bearings should be replaced.

QUEER STEERING may be advance notice of a blowout. Stop, locate bad tire, and replace with spare.

TURNING CORNERS at high speed grinds rubber from tires, strains side walls. Turn steering wheel slowly always.

BUMPING into curbs, driving off concrete highway may pinch tube against rim, tear cords, and later cause blowout.

HIGH SPEED generates heat inside tires, and rubber deteriorates faster. High speed with heat creates blowout hazard. Tires normally wear less in winter and in rainy seasons than in summer. Inspect all your tires frequently.

SLAMMING ON BRAKES grinds rubber off all four tires, strains casings. Unequal braking has the same effect. Be sure brakes are equalized by having them checked often on good brake-testing machine.

REAR TIRE BLOW-OUTS are just as dangerous as front tire blow-outs. If street is slippery, dangerous skid results. Do not drive car with treads worn smooth—you endanger too many lives.

SPINNING WHEELS injure tires through abrasion, excessive heat. To get out of mud or snow, try starting in high.

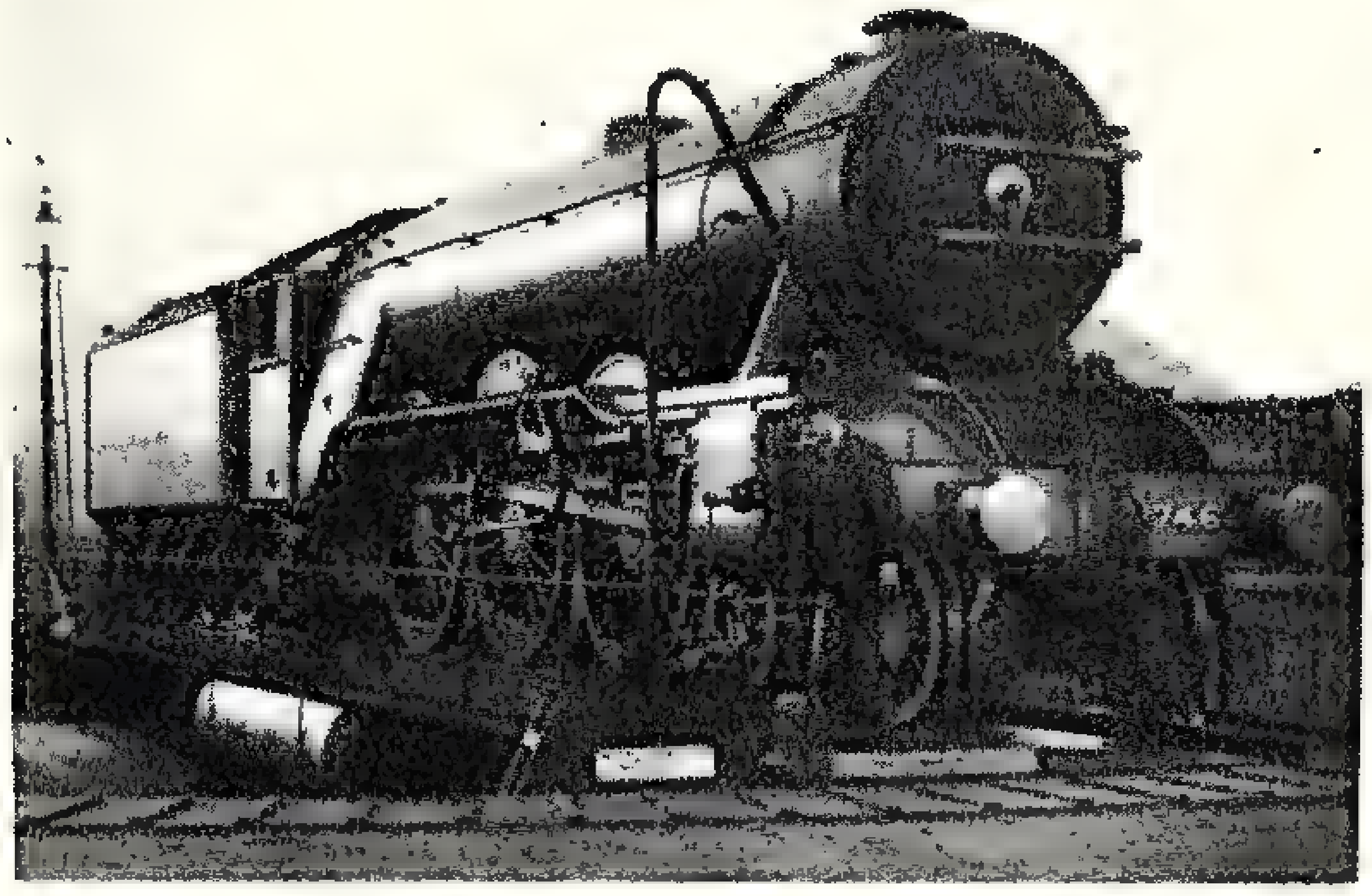
Rare Whistling Arrows to Be Shown at California Exposition

Arrows which whistle and this unusual reverse bow will be among the old exhibits at California's forthcoming world fair.

RARE old Chinese arrows, equipped with jade heads which whistle as they speed through the air, are among the feature exhibits in the Palace of Science at the California Pacific International Exposition at San Diego. These odd missiles were used by the Orientals to attract attention. They are a part of the Jessup collection, claimed by authorities to contain the world's best archery display.

Engine Brake Drives Turntable

HEAVY locomotives may operate turntables under their own power through the attachment of the vacuum brake pipe to a recently devised vacuum engine which is mounted on the turning platform. When it is too costly to use electrical or mechanical means, the new device is said to halve the time usually required to operate a turntable by hand.

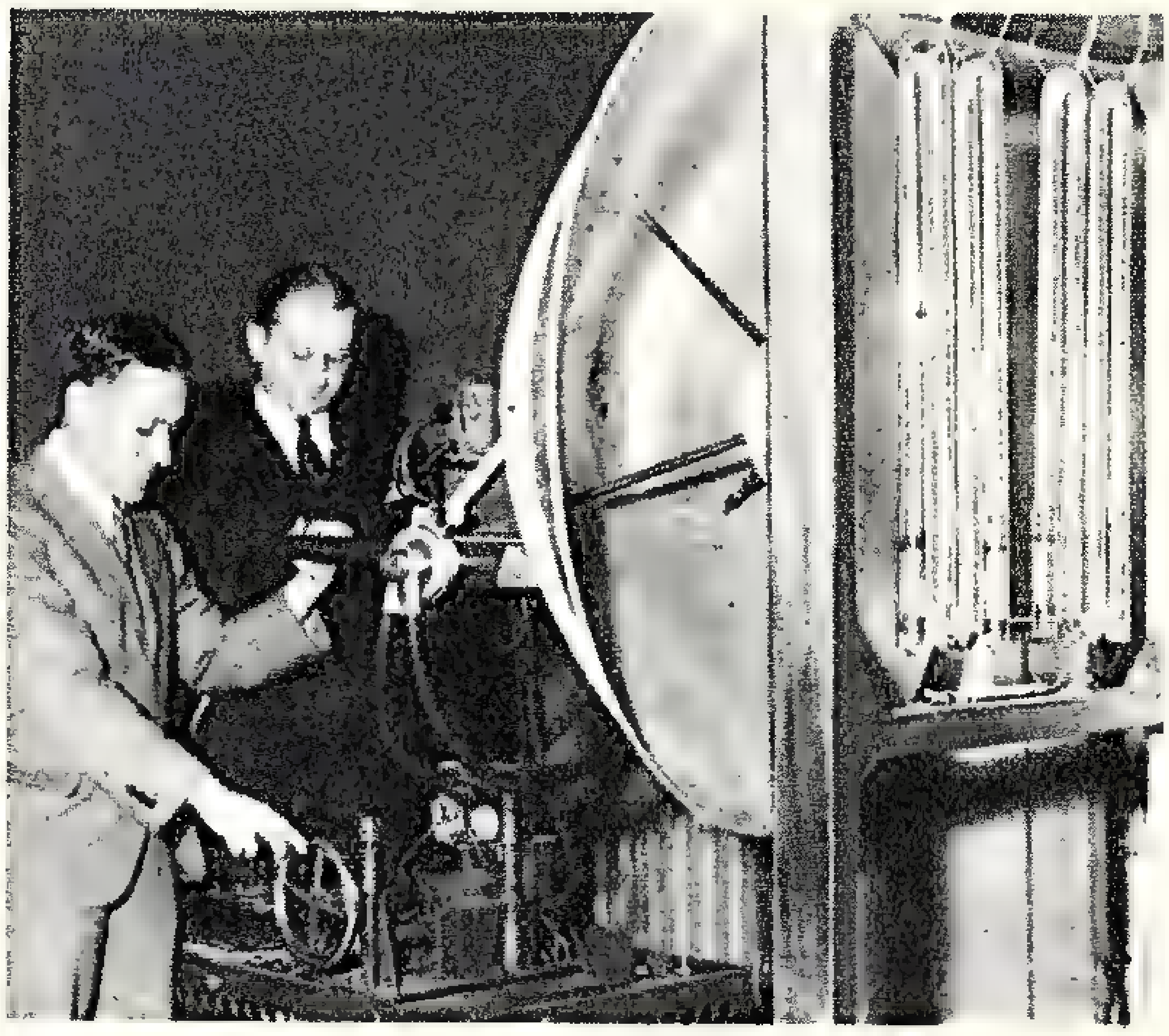


This English locomotive connects its vacuum brake pipe to a small motor to turn the table under its own power. Note vacuum tank under locomotive platform for power reserve.

Sawdust Seen As Cattle Fodder

ORDINARY sawdust, treated with sugar, was found recently to provide an excellent fodder for dairy cattle. Although sawdust will not displace regular feeds, cows fed on the supplementary diet actually yielded more milk and enjoyed better health than other bovines.

New Transmitter Uses Neon Tubes

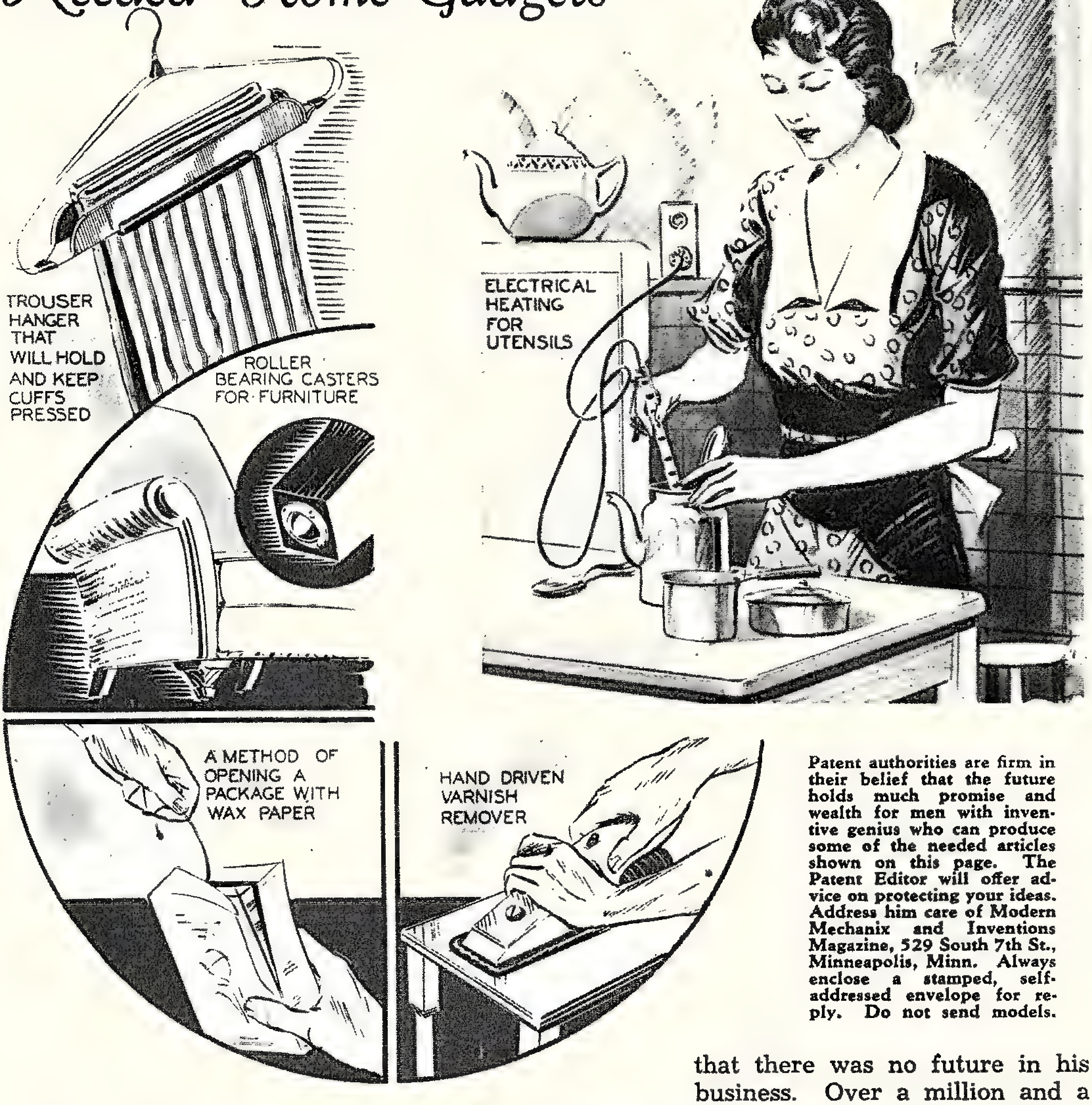


The new radio transmitter, shown above, operates on an ultra-short wave length of nine centimeters. Neon tubes are used to transfer voice signals to reflected wave beam.

A NEW type of radio transmitter, generating an ultra-short wave length of nine centimeters, or less than four inches, was demonstrated recently at Rochester, N. Y.

"Acorn" tubes are used in generating the waves, while a parabolic reflector, placed just back of the short antenna, reflects the waves like light. Banks of ordinary neon tubes, placed in the path of the ultra-short wave beam, transfer to this beam voice signals of audio-frequency. By this radically new method, ultra-short wave signals have been modulated for the first time without changing their frequency. Great privacy in radio communication is expected to result.

Big Money Awaits Lucky Inventors Of Needed Home Gadgets


TROUSER HANGER THAT WILL HOLD AND KEEP CUFFS PRESSED
ROLLER BEARING CASTERS FOR FURNITURE
ELECTRICAL HEATING FOR UTENSILS
A METHOD OF OPENING A PACKAGE WITH WAX PAPER
HAND DRIVEN VARNISH REMOVER

Patent authorities are firm in their belief that the future holds much promise and wealth for men with inventive genius who can produce some of the needed articles shown on this page. The Patent Editor will offer advice on protecting your ideas. Address him care of Modern Mechanix and Inventions Magazine, 529 South 7th St., Minneapolis, Minn. Always enclose a stamped, self-addressed envelope for reply. Do not send models.

Students of the patent situation, who have studied the expansion of the United States patent system and who have traced its growth from the first patent signed by President George Washington, feel that great days are still ahead for the American inventor. These will be days of opportunity and need for new ideas. Before many years have passed at least 100,000 patents will be issued annually in this country.

The prospects are indeed a far cry from back in the 70's when a young examiner in the Patent Office quit his job because he thought everything had been invented and that there was no future in his business. Over a million and a half patents have been issued since his day. Many of them have covered major inventions like the electric light, the vacuum tube, the printing telegraph, the automobile and the airplane. This young man forgot that "inventions beget inventions" and the more we have, the more we must have.

After having touched upon a highly specialized field in previous columns, we return this month to a miscellaneous list of needed inventions with the hope of stimulating inventors with varied talents.

The old-fashioned automobile chains with their breaking links are rapidly succumbing

[*Continued on page* 142]

America's Part in Soviet

FEW people realize, even today, how important a part America played in the greatest drama in history, the Five Year Plan of Soviet Russia.

This octopus-like rebuilding program, which provided mighty power plants, towering steel mills, and humming factories surpassed in size only by the American plants after which they were patterned, was brought to a highly successful conclusion in 1932. The second Five Year Plan of the U. S. S. R., now half-completed, calls for more factories and more machines, but stresses the production and consumption of Soviet-made goods.

With the establishment of friendly relations between the Soviet and American governments, greater and greater interest is being taken by Soviet engineers in the mass production methods employed by American manufacturers. Many Soviet commissions are being sent to this country to make studies in different industrial fields, and to make preliminary arrangements for the purchase of American-made machinery.

In the great iron and steel-working factories American technical methods are most evident. Largest in Europe are the Gorky and AMO (Moscow) automobile factories. At Gorky alone

DNIEPROGES—WORLD'S GREATEST POWER PLANT

POWER FARMING

Little more than a decade ago, there was born from revolution and chaos the Union of Socialist Soviet Republics, a gigantic empire of a hundred different nationalities. The rebuilding of U. S. S. R. by Five-year Plans is the world's greatest engineering miracle.

Engineering Triumphs

140,000 Ford trucks and passenger cars a year can be turned out by American assembly line machinery.

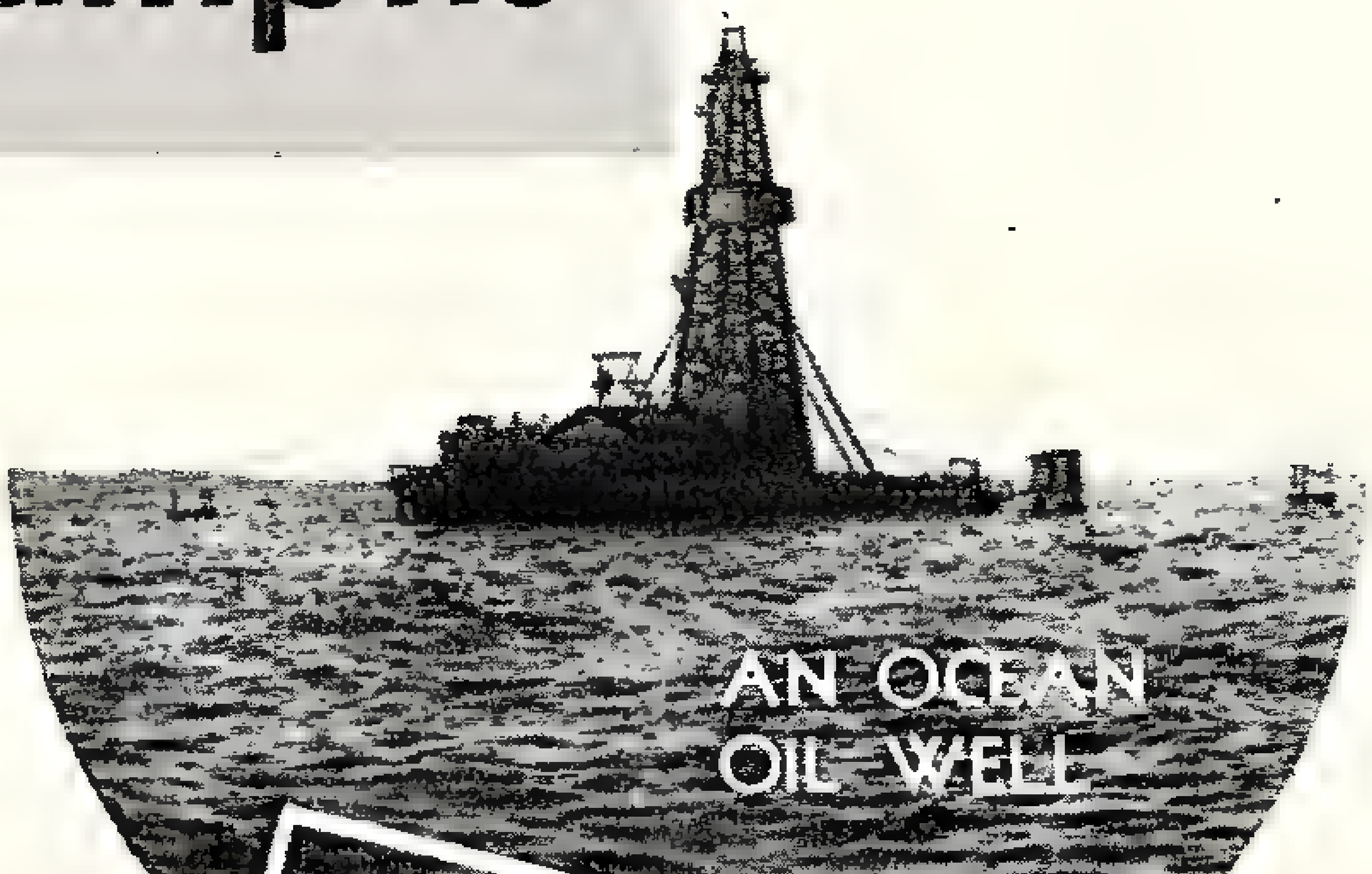
High in the Ural mountains is Magnitogorsk, largest of European steel mills, the supply center for the metal industry. Here four blast furnaces are belching flame and smoke into the heavens day and night, converting a daily quota of 1,000 tons of iron ore into high quality pig iron. At Kuznetz, in Central Siberia, are three huge American-type blast furnaces, half a dozen open hearth furnaces, and other steel-working equipment.

Serving the steel machinery industry is the impressive Moscow ball-bearing plant, capable of producing 24,000,000 steel balls and roller bearings a year, of 100 different types.

Probably the largest caterpillar-type tractor plant in the world is at Cheliabinsk. This single plant is capable of turning out 40,000 tractors a year for Soviet agriculture and industry.

Soviet metal workers point with pride to the largest welded steel bridge in the world, spanning the Avushka river at Stalinsk.

Starting operation this year at Kharkov, the world's largest turbo-generator works is



AN OCEAN OIL WELL

MIGHTY MAGNITOGORSK BLAST FURNACES

MAXIM GORKY— LARGEST LAND PLANE

American engineers, American materials, American money played no little part in the success of Russia's empire-rebuilding program. From this budget of work and progress came forth mighty power plants, steel mills, factories, many the largest in the world.

WORLD RECORDS

GREATEST POWER PLANT is Dnieproges (as it is now called), famous $110,000,000 Dnieper River hydro-electric project.

KING OF LAND PLANES is the Soviet "Maxim Gorky," carrying 40 passengers and crew of 23, with a printing plant, movie projector and loudspeakers for educational work.

HIGHEST IN THE AIR went the Red Army stratostat U. S. S. R., to set a stratosphere record of nearly 12 miles.

FIRST as regards the use of airplanes in forestry and agriculture, is U. S. S. R. From the air seed is sown, frost driven away, insect-killing chemicals dropped upon forests.

LONGEST RIVER ROUTE for navigation, a 2,100 mile waterway connecting Moscow with Archangel, opened this year.

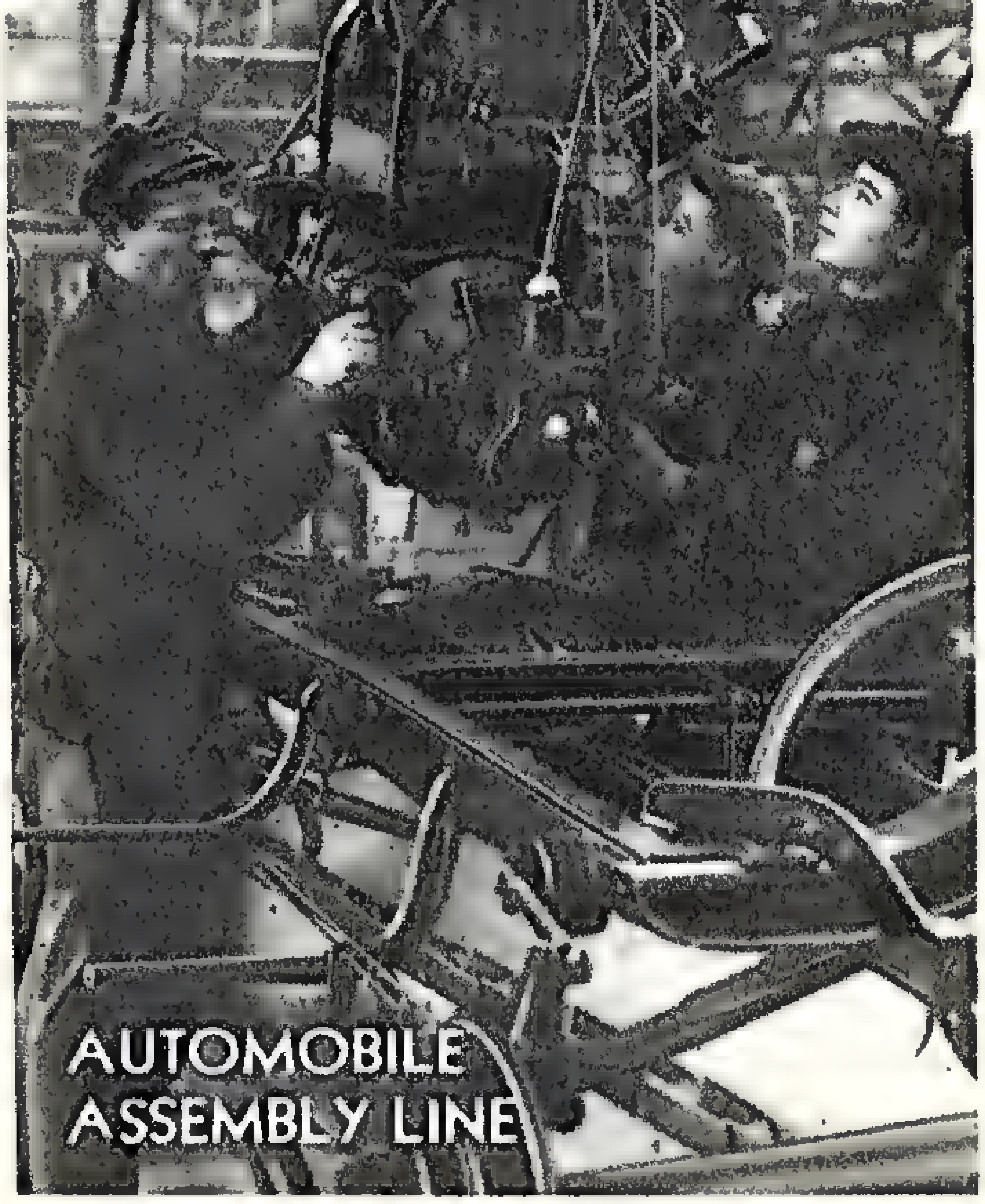
MIGHTIEST ON THE AIR is Moscow's 500 kilowatt radio station, reaching out to every corner of the Soviet empire.

LARGEST ELECTRIC LOCOMOTIVE for passenger service, Russia's 2-3-2 PB, can haul 20 cars at 80 miles per hour.

BALTIC WHITE SEA CANAL

Canal building progresses rapidly in the Soviet Union. Already the Baltic Sea and the White Sea have been connected by a 141-mile long ship canal having 19 locks, 15 dams. Soviet steamers no longer have to circle Norway, Sweden and Finland to go from Leningrad to Archangel. Other Volga river canals are under construction.

Largest in Europe are the Gorky and AMO automobile factories. At Gorky 140,000 Ford trucks and passenger cars can be turned out each year. The AMO plant (at Moscow) has a capacity of 50,000 heavy trucks a year. American assembly line methods were introduced into these plants by America's best engineers.



to produce power generating units of up to 200,000 kw. size, for future hydro-electric projects.

Preliminary work is now under way on the greatest power plant in history, the Lower Volga hydro-electric plant, which is to have four times the output of the world-famous Dnieper River project. Over 10,000,000 acres of the drought-ridden trans-Volga region will be irrigated by use of this power.

Standing out among Soviet hydro-electric achievements is the Dnieper River dam and plant, now known as Dnieproges. Nine American-made turbo-generator units are here rapidly approaching their capacity output of 756,000 h.p., as the waters of the turbulent Dnieper rise to a height of 120 feet behind the largest masonry dam ever built. The power project and inter-connected industrial plants at Dnieproges will eventually involve a total cost of $800,000,000.

[*Continued on page* 130]

Radio-Operated Stream Depth Indicator Warns of Floods

Photo above shows semi-portable gauge in Californian stream. Right—I. M. Ingerson is seen with transmitter and keying device which broadcasts warnings when water level increases.

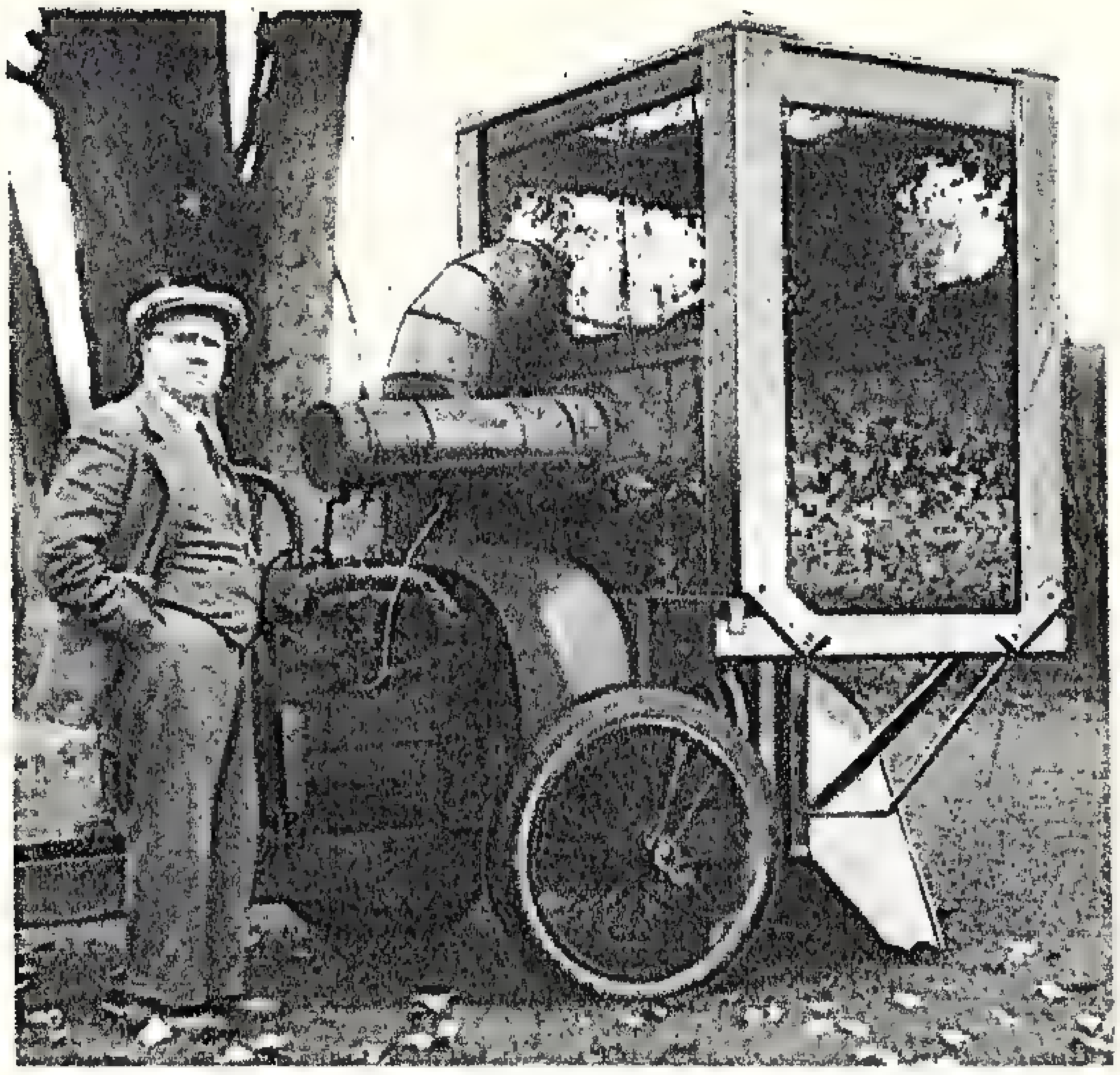
RADIO has been brought into use in flood patrol work along California's streams to broadcast warnings in the event of high water.

Automatic stream gauge transmitters, housed in long corrugated tubes which extend down into the center of the river, send out their reports at frequent intervals so that water stages in distant streams may be determined at receiving office. As an aid in flood control and watermaster service, the new indicators have considerable value. They not only give advance information on stream fluctuations but also transmit signals from time to time, indicating the actual gauge height of the stream at the particular moment.

Invented by I. M. Ingerson, hydraulic engineer, the radio stream depth indicator is handled by an automatic keying device.

Odd Device Vacuum Cleans Lawns

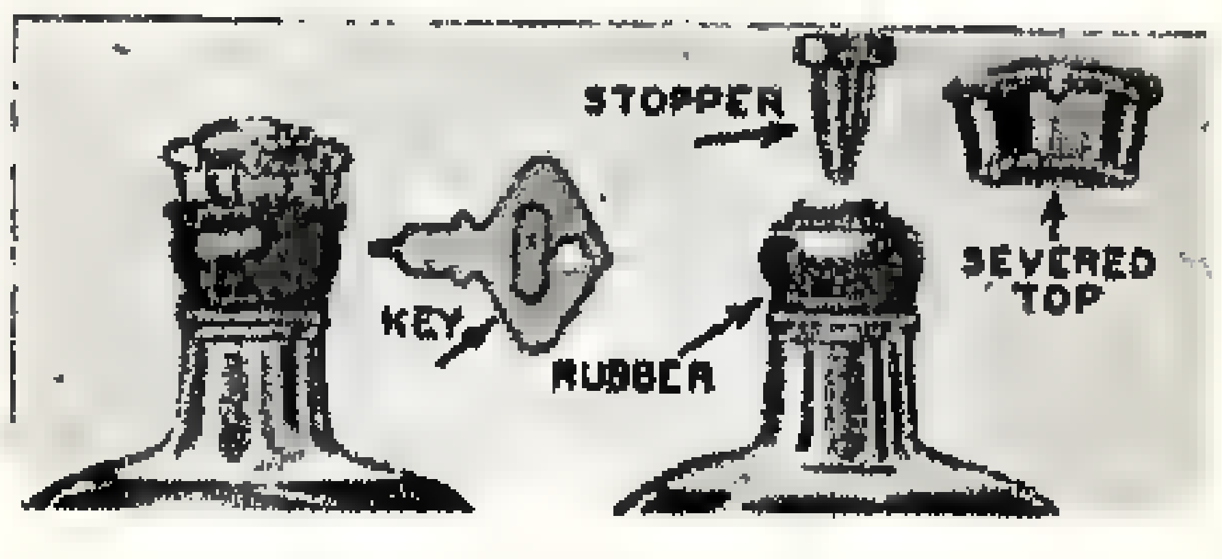
A GIANT outdoor vacuum cleaner for use in parks and on private lawns and golf courses, has been invented by George H. Eddy of Seattle. Capable of doing the work of 20 men, the machine creates a suction powerful enough to clean the grounds of leaves, twigs, loose dirt and all other debris.



Inventor George H. Eddy exhibits his outdoor leaf-collector. Suction lifts debris off ground, depositing it in screen cage.

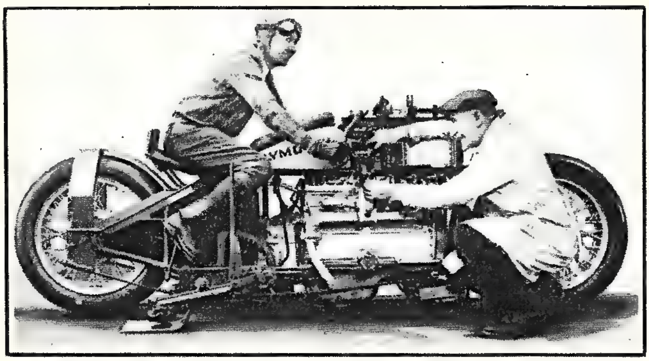
Lock Protects Bottled Contents

A TAMPER-proof bottle cap which can be opened only with a key is now on the market. The key is inserted in the neck and turned until the top snaps off. With the stopper removed, the contents can be poured.



Key inserted in neck unlocks top. Opened bottle is used but once.

Seeks 300 m.p.h. With Motorcycle Powered By Auto Engine



Fred Luther, Los Angeles racer, is shown seated on his specially built motorcycle with which he hopes to exceed 300 m.p.h. It is powered by a 6-cylinder auto engine. Note brake skid on ground in front of rear wheel.

THREATENING to smash all existing motorcycle speed records, Fred Luther, Los Angeles racer, has just completed assembling an unique motorcycle which he claims will exceed 300 m. p. h.

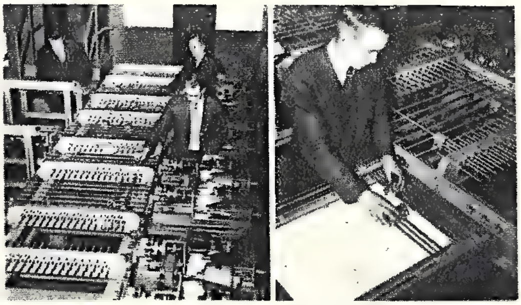
Powered by a six-cylinder Plymouth automobile engine with fan end generator removed, his special racing job is now undergoing a series of speed tests on the Pacific Coast. The 1,500-pound machine has a wheelbase of 85 inches and an over-all length of 115 inches. The frame is a standard one which has been lengthened and reinforced with steel tubing. Luther steers his motorcycle through two large sprockets connected by a ¾-inch chain. The steel plates, mounted in front of the rear wheel, act as brakes when lowered.

Automat Swaps Candy for Bottles

TO INSURE the return of empty milk bottles and eliminate the cost of replacements, an automat has been devised which dispenses candy and gum in exchange for "empties." Shaped and painted like a huge milk bottle, the container has a capacity of 60 bottles. The empty bottle is placed on a red hook in an opening near the top and a handle is pushed to the right to deposit the bottle. Gum or candy is discharged into the customer's hands.

Empty milk bottles deposited in automat reward customer with candy or gum. Sanitary device reduces bottle losses.

3-Ton "Brain" Is Problem-Solver



The world's largest "mechanical brain" solves difficult problems speedily and with little error. Miles Nelson, right, who helped develop the device is shown at the answer table.

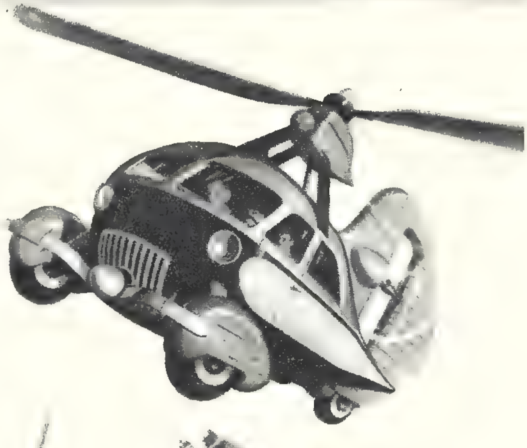
THE largest and keenest "mechanical brain" in the world was exhibited recently for the first time at the University of Pennsylvania. Weighing three tons, the mechanism can solve complex problems in one-sixth of the time usually required by human mathematicians.

The novel machine has ten "integrators," each of which is set by a hand dial to determine the effect of a variable quantity on the problem at hand. During the setting of a dial, a knife-edged wheel comes in contact with a small steel disc. By controlling friction, the speed of the small wheel becomes the main factor in problem-solving.

Built at a cost of $50,000, the device required the services of 115 skilled workers over a 15-month period before it was completed.

GIRO-Automobile FLIES Without WINGS

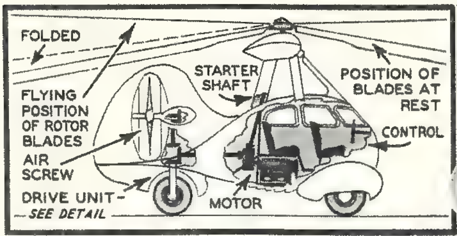
The wing-less autogiro and the invention of a combined land and air drive makes the dream of the flying auto come true.



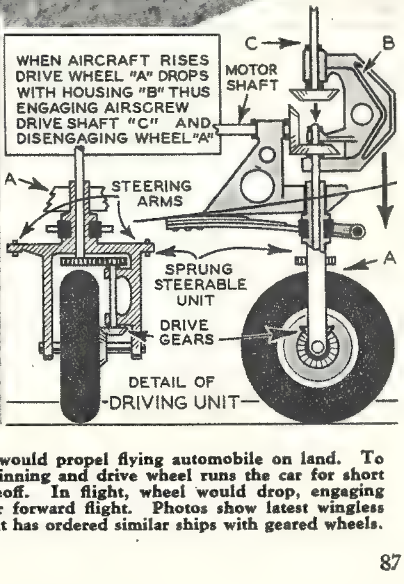
FLYING automobiles are within reach of the public today as a result of a dual drive for land or air invented by Edward A. Stalker, of Ann Arbor, Mich. His gear drive includes a simple clutch which engages a wheel to drive the car on land or a propeller to push the vehicle through the air.

Based on this invention, the giro-automobile was designed. In appearance it resembles the modern streamlined, rear engine automobile. No wings are necessary as autogiro blades would provide the necessary lift.

The U. S. Bureau of Air Commerce has ordered the Pitcairn Autogiro Company to design an autogiro airplane-automobile for amateur fliers, which with its rotor blades folded back and its engine geared to the wheels can be driven on a highway like a motor car.


FOLDED
FLYING POSITION OF ROTOR BLADES
STARTER SHAFT
POSITION OF BLADES AT REST
CONTROL
AIR SCREW
DRIVE UNIT - SEE DETAIL
MOTOR

Sectional diagram above shows how Stalker's dual drive system would be used in giro-auto.


WHEN AIRCRAFT RISES DRIVE WHEEL "A" DROPS WITH HOUSING "B" THUS ENGAGING AIRSCREW DRIVE SHAFT "C" AND DISENGAGING WHEEL "A"
C
B
MOTOR SHAFT
A
STEERING ARMS
SPRUNG STEERABLE UNIT
A
DRIVE GEARS
DETAIL OF DRIVING UNIT

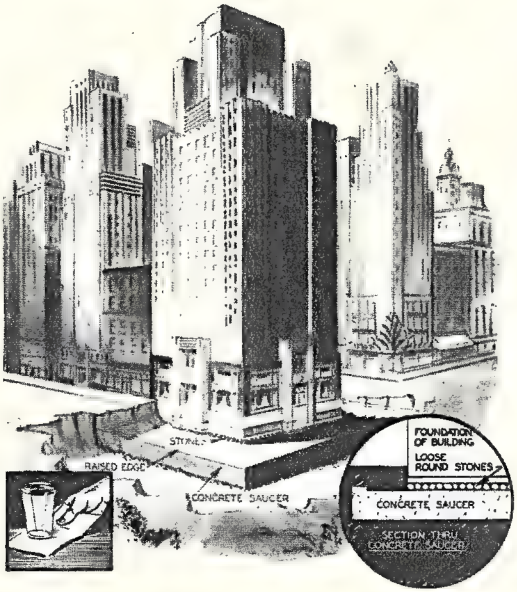
Drive wheel A in above diagram would propel flying automobile on land. To take off giro blades are started spinning and drive wheel runs the car for short distance needed for autogiro takeoff. In flight, wheel would drop, engaging shaft C which drives propeller for forward flight. Photos show latest wingless Pitcairn autogiro. The government has ordered similar ships with geared wheels.

Skyscrapers Roll On Ball Bearings When Earthquake Occurs

TO ELIMINATE the danger of buildings toppling during earthquakes, R. W. de Montalk, New Zealand architect, proposes building skyscrapers on ball bearing bases.

A rectangular platform of concrete with raised edges is sunk in the ground, and on this saucer are laid rounded beach stones which, like ball bearings, move back and forth during a disturbance, thus permitting the building to remain in a safe, upright position.

The plan is based on the theory that earthquake damage to tall structures rarely results from sudden sinking or upthrust of the soil. More often, the earth tremors start a rigid building to sway until its cracking foundation finally causes collapse.

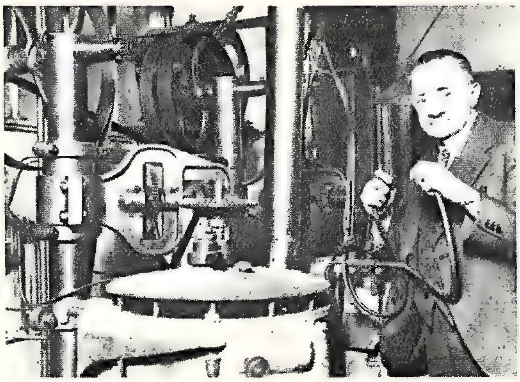


Jerking a sheet of paper suddenly from beneath a tumbler will not upset its contents. On this theory a New Zealand architect has conceived the plan, shown above, for building skyscrapers on a concrete platform covered with round stones to prevent collapse of the tall structures during earthquakes.

Extracts Cheap Gas from Mineral

CLIMAXING ten years of experimentation, N. H. Freeman, London chemist, has perfected a process to extract high grade gasoline from minerals. Better mileage than with normal gas is claimed for the new fuel which will retail at four cents a gallon.

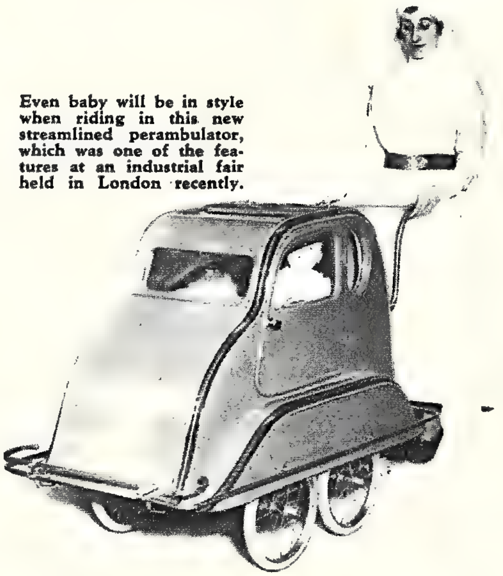
Produced from torbanite, a mineral hitherto regarded as worthless, the gasoline has been subjected to numerous tests in autos and airplanes. A plant in South Africa will manufacture the new product.



N. H. Freeman of London examines a laboratory transformer he employs to produce low cost gas from useless mineral.

Even Baby Buggy Is Streamlined

Even baby will be in style when riding in this new streamlined perambulator, which was one of the features at an industrial fair held in London recently.



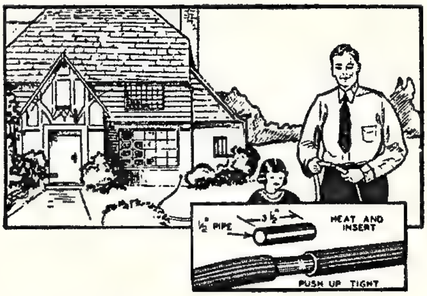
STREAMLINING, which has invaded the automotive industry and revolutionized railroad design, has at last been felt by the manufacturers of baby carriages. A stormproof, streamlined perambulator recently was exhibited at an industrial fair in London.

"Radio Roof" Is 450 Miles High

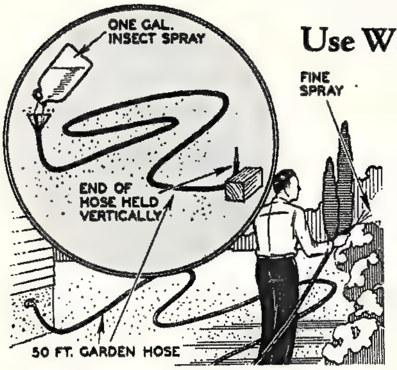
THE world's tallest "radio roof," 450 miles up, has been discovered by scientists at the Bureau of Standards. The ceiling, the outermost layer of ionized air known, makes long distance communication possible by reflecting radio signals to the earth.

SUMMER KINKS

Vulcanizing Breaks In Garden Hose



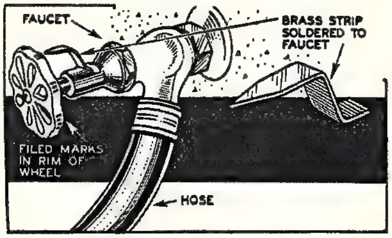
WHEN leaks are found in a small portion of your garden hose, but the remainder of the hose is still in good condition, cut out the damaged section. Bevel off the edges of a 3 or 4 inch length of ½" diameter pipe, then heat this pipe enough so that it will melt but not burn rubber. Quickly force the ends of the hose over the pipe, push the sections together, and allow to stand until cool.
—O. E. Olson.



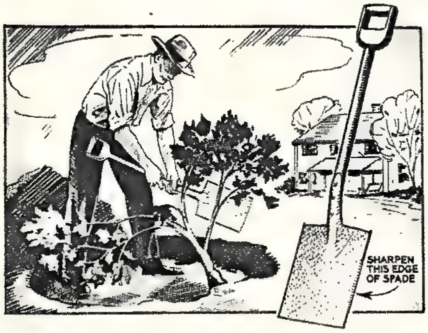
Use Water Pressure and Garden Hose to Spray Shrubs

IF NO power spray pump is available, and you have fruit trees, a hedge, or shrubs that need spraying, the home water pressure system may be called on to supply pressure. Empty all water from the hose, prop up the nozzle end, and open the nozzle. Insert a funnel in the other end, and pour in a gallon of the spray mixture. This should just about fill a 50-foot length of ¾" hose. Attach the hose to the water sill cock, adjust the nozzle to the finest spray, and turn the water on slightly. This forces out the spray mixture.—H. Sibley.

Mark Sill Cock for "Blind" Sprinkling



WHEN the lawn sprinkler is set around the corner of the house or behind shrubbery where it cannot be seen from the sill cock, it is difficult to adjust to the required pressure. By soldering a pointer to the body of the valve and filing marks on the handwheel which indicate the area covered by the sprinkler, any definite pressure can always be obtained.—Joe Morrow.

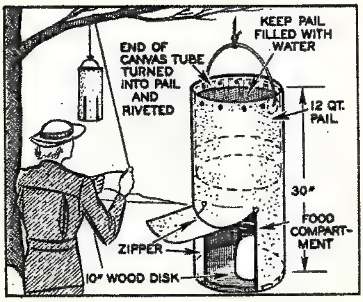

SHARPEN THIS EDGE OF SPADE

Sharpened Spade Edge Serves As Root Axe

WHEN transplanting trees or digging trenches, roots are encountered which oftentimes cannot be cut by the rock-dulled cutting edge of the spade. By sharpening one side of the spade for a distance of about six inches, down to within an inch of the end, roots may be sliced off with one blow of the spade used as an axe. Since this edge does not hit rocks, it can be kept sharp easily with a file or emery wheel. Whether working in the garden or field, this revamped spade will be handy.—A. H. Waychoff.

COMFORTS FOR CAMPERS

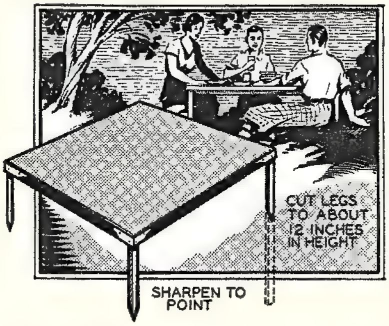
Iceless Cooler for Camp Hangs from Tree

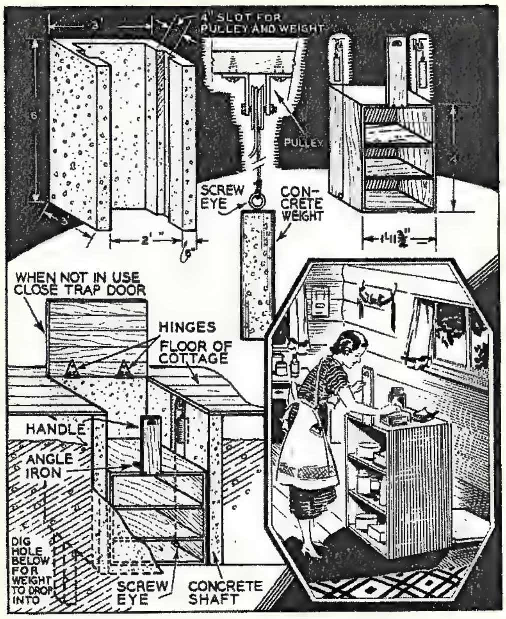

KEEP PAIL FILLED WITH WATER
END OF CANVAS TUBE TURNED INTO PAIL AND RIVETED
12 QT. PAIL
30"
FOOD COMPART-MENT
ZIPPER
10" WOOD DISK

ALL campers will appreciate this simple homemade cooler, in which evaporation of water from the canvas sides, which are kept continually moist by capillary action, cools milk, butter, and meats inside the hood. A piece of 12-ounce canvas about 36"x40" in size is sewed into a tube into which a 12-quart pail will fit snugly. The ends of the tube are folded over the pail rim, and riveted in position. A door flap about 6"x10" in size is cut out from one side, and zipper fastening strips sewed to the sides.—Dick Cole.

Shortened Card Table Is Ideal for Picnics

BY CUTTING down the legs of an old card table to about 12-inch length, and sharpening the legs to a point, you can have a picnic table which will not wobble, yet can be folded up and stowed away in the back of the car. The pointed legs can be pushed into the ground easily. A bit of oil smeared over each leg will discourage ants. Picnickers sit on the ground.—Chet Sullivan.


CUT LEGS TO ABOUT 12 INCHES IN HEIGHT
SHARPEN TO POINT

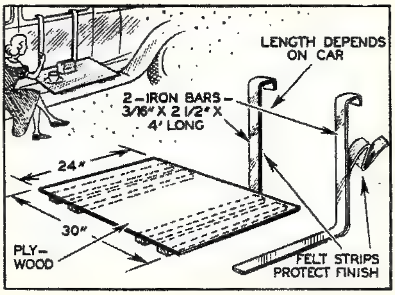

4" SLOT FOR PULLEY AND WEIGHT
3'
6
3"
2'
6"
PULLEY
SCREW EYE
CON-CRETE WEIGHT
4
WHEN NOT IN USE CLOSE TRAP DOOR
HINGES
FLOOR OF COTTAGE
HANDLE
ANGLE IRON
DIG HOLE BELOW FOR WEIGHT TO DROP INTO
SCREW EYE
CONCRETE SHAFT

A Built-In Cooler for Cottages

FOOD can be kept cool without ice during those hot summer days at the lake cottage with this novel built-in cooler. A concrete shaft is built below the floor of the cottage, going down at least six feet—deeper if possible. Grooves in which a shelved box slides up and down are made on two opposite sides. This box is suspended by ropes which go over pulleys attached to floor rafters, then down the outside of the concrete chamber, to counter-balance weights. A trapdoor in the floor keeps the box at the bottom of the pit. Holes are made for the weights to drop into, to bring the cooler box bottom just about even with the floor when food is to be taken out.—John E. Hoar.

Attach Folding Camp Table to Your Car

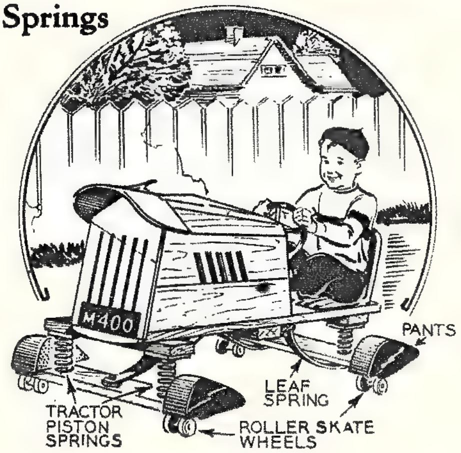
THE drawings at the right show a simple camp table that can be carried along in the car, and set up in a minute for a picnic lunch. The running board of the car provides seats for two. Iron bars are bent as shown, to hook over a door of the car. Cleats are nailed to the underside of the plywood table top, to keep the strap iron bars apart.—R. J. Bacon.

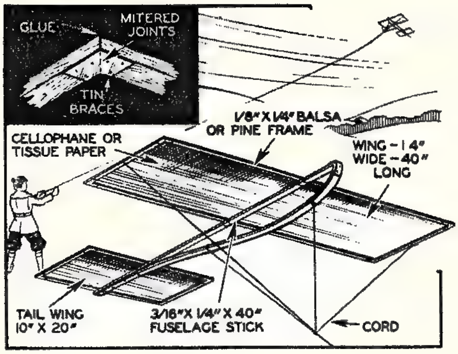

LENGTH DEPENDS ON CAR
2—IRON BARS—3/16" X 2 1/2" X 4' LONG
24"
30"
PLY-WOOD
FELT STRIPS PROTECT FINISH

OUTDOOR FUN PROJECTS

Roller Skate Racer Has Knee Action Springs

FOUR tractor piston springs, each set above a pair of roller skate wheels, provide the knee action for this novel midget auto. Pants made from plywood and tin are placed over each wheel, and painted in a zig-zag design to enhance the streamlined effect of the rearward-slanted radiator. Sections of a leaf spring are bolted loosely to the frame of the car and to the axles, to prevent any back and forth movement of the axles on rough roads. Several bed springs may be used on each wheel in place of the stiffer tractor springs.—Johnny Crymes.


M400
PANTS
LEAF SPRING
TRACTOR PISTON SPRINGS
ROLLER SKATE WHEELS

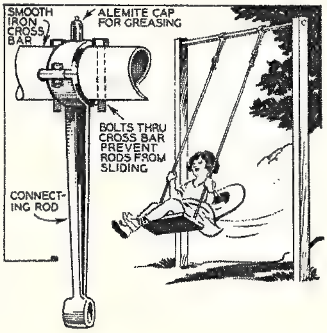

GLUE
MITERED JOINTS
TIN BRACES
1/8"X1/4" BALSA OR PINE FRAME
CELLOPHANE OR TISSUE PAPER
WING - 14" WIDE - 40" LONG
TAIL WING 10" X 20"
3/16"X 1/4" X 40" FUSELAGE STICK
CORD

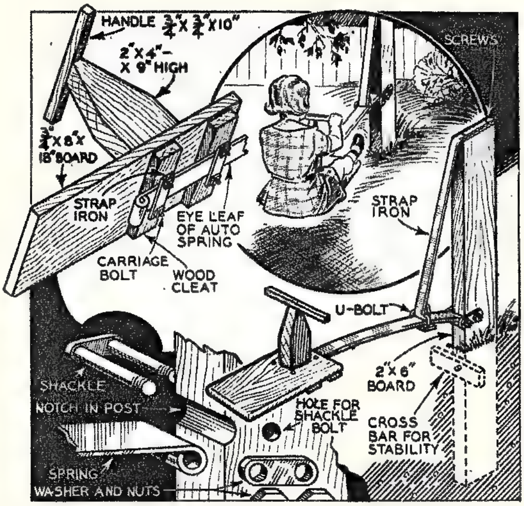
Kite Glider Uses Cellophane Covering

COMBINING desirable features of both kite and glider, this gliding kite can be controlled even in a strong wind. If a string release mechanism is used, the glider can be set loose once it is aloft, and allowed to glide back to earth. Use either balsa or soft pine for the frame of this novel kite glider. —G. E. Van Horn.

Connecting Rods Make Back Yard Swing Safe

FAR safer for the kiddies than the old method of tossing ropes around a tree limb is this lubricated bearing play swing. An iron rod or pipe of the same size as the connecting rod bearing is mounted between upright posts. The ends of the rope are tied through the wrist pin holes.—Ralph Anderson.


SMOOTH IRON CROSS BAR
ALEMITE CAP FOR GREASING
BOLTS THRU CROSS BAR PREVENT RODS FROM SLIDING
CONNECTING ROD


HANDLE 3/4"X 3/4"X10"
2"X4"- X 9" HIGH
SCREWS
3/4"X 8"X 18" BOARD
STRAP IRON
EYE LEAF OF AUTO SPRING
STRAP IRON
CARRIAGE BOLT
WOOD CLEAT
U-BOLT
SHACKLE
NOTCH IN POST
2"X 6" BOARD
HOLE FOR SHACKLE BOLT
CROSS BAR FOR STABILITY
SPRING
WASHER AND NUTS

A One-Seat Bouncing Teeter-Totter

THE novelty of this teeter-totter lies in its simplicity, for a single leaf from an auto spring supplies the motion. A seat with cross-bar handles is bolted to one end of the spring, and the other end fastened to an upright post sunk into the ground. Notch the upright about 6″ above the ground, and use a spring shackle to hold the spring in this notch. A piece of strap iron attached to the spring with a U-bolt keeps it in a horizontal position. The child places his legs on the handlebar support. For children older than five years, two or more spring leafs are needed.—H. A. Dahl.

EXPLORE Lake BOTTOMS With

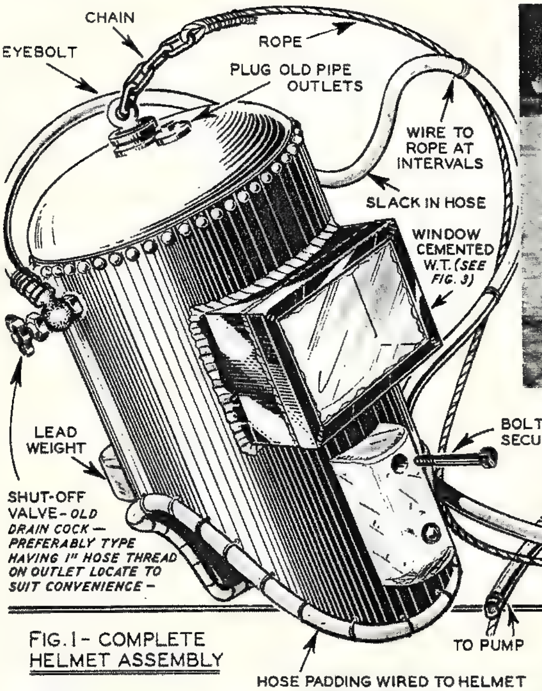
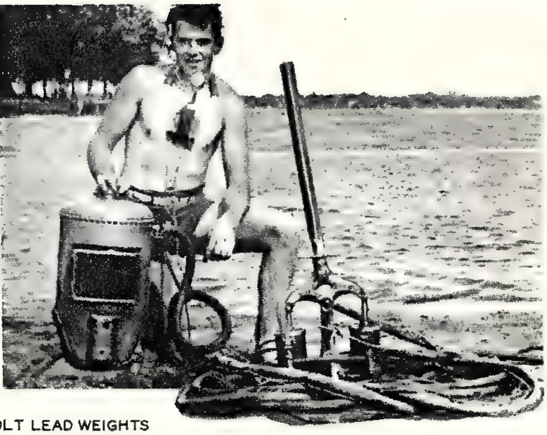
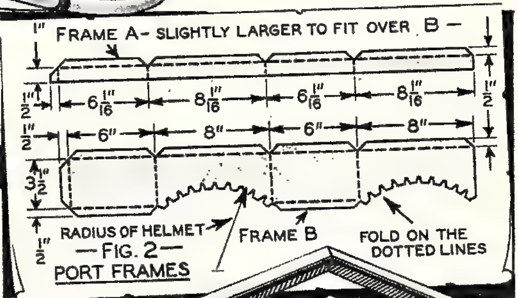

CHAIN
EYEBOLT
ROPE
PLUG OLD PIPE OUTLETS
WIRE TO ROPE AT INTERVALS
SLACK IN HOSE
WINDOW CEMENTED W.T. (SEE FIG. 3)
LEAD WEIGHT
BOLT LEAD WEIGHTS SECURELY TO HELMET
SHUT-OFF VALVE - OLD DRAIN COCK — PREFERABLY TYPE HAVING 1" HOSE THREAD ON OUTLET LOCATE TO SUIT CONVENIENCE —
TO PUMP
HOSE PADDING WIRED TO HELMET

FIG. 1 - COMPLETE HELMET ASSEMBLY



Complete diving unit as used by author of this article. Phone set worn is the one used by shore man.


1"
FRAME A - SLIGHTLY LARGER TO FIT OVER B —
1/2"
6 1/16"
8 1/16"
6 1/16"
8 1/16"
1/2"
1/2"
6"
8"
6"
8"
3 1/2"
1/2"
RADIUS OF HELMET
FRAME B
FOLD ON THE DOTTED LINES

— FIG. 2 — PORT FRAMES

APPROXIMATE WATER PRESSURE	
DEPTH	LBS. PER SQ. INCH
10 FEET	4.5 " " "
20 "	9.0 " " "
30 "	13.0 " " "
40 "	17.5 "EXPERIENCED
50 "	22.0 DIVERS ONLY

Pump used must deliver even flow of air in excess of pressure shown at left for each depth to keep water out of diving helmet.

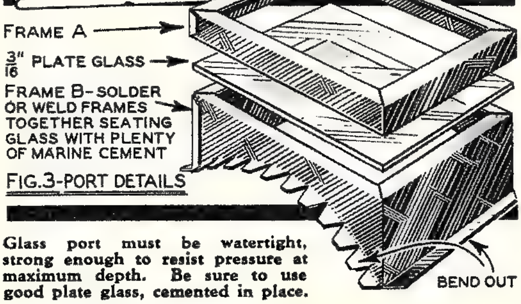

FRAME A
3/16" PLATE GLASS
FRAME B - SOLDER OR WELD FRAMES TOGETHER SEATING GLASS WITH PLENTY OF MARINE CEMENT
BEND OUT

FIG. 3 - PORT DETAILS

Glass port must be watertight, strong enough to resist pressure at maximum depth. Be sure to use good plate glass, cemented in place.

by GARRY GROVER

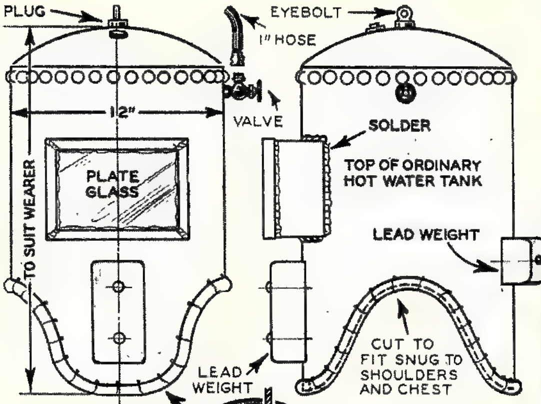
AMATEUR diving is rapidly becoming one of the most popular of summer sports. Along both the Atlantic and Pacific seaboards and in almost every inland lake and river, under-water explorers are rapidly pushing back the last American frontier, delving into secrets of nature which for countless ages have been concealed by tons and tons of water.

With the diving helmet described here, a measured depth of approximately fifty feet, believed to be a record for amateur divers, was reached at Lake Minnetonka, near Minneapolis, Minn. Many other dives made with this helmet have been over an hour in length. If a few simple precautions are observed, there is no more danger in diving with a helmet than in ordinary swimming. The added feature of the two-way radiophone set, eliminates many of the dangers of amateur diving. The person at the surface, operating the pumps, is always in direct communication with the diver, and knows just what he is doing.

The helmet is constructed from the top of an ordinary hot water tank. The tank should be cut sufficiently long to allow the user plenty of head room. It is then cut to fit over the shoulders and chest as shown in Figures 1 and 4. This should be done with care, as a good fit means more comfort and less loss of air. Next, the port or window should be cut out. This is best located by trying the helmet on and marking the approximate position.

RADIOPHONE DIVING Helmet

This helmet for amateur divers, with its built-in two-way radiophone communication system, is designed for both pleasure and profit. With it you can carry out under-water phofography, study the habits of fish, locate sunken outboard motors and boats, or merely explore.


PLUG
EYEBOLT
1" HOSE
12"
VALVE
SOLDER
TOP OF ORDINARY HOT WATER TANK
PLATE GLASS
TO SUIT WEARER
LEAD WEIGHT
CUT TO FIT SNUG TO SHOULDERS AND CHEST
LEAD WEIGHT
FRONT VIEW
SIDE VIEW

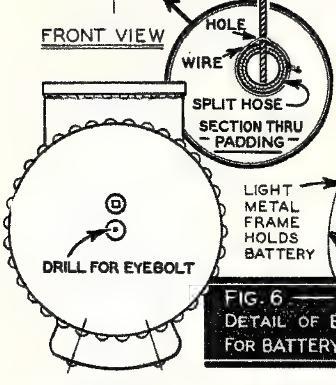

HOLE
WIRE
SPLIT HOSE
SECTION THRU PADDING
DRILL FOR EYEBOLT
TOP VIEW

FIG. 4 - THREE-VIEW DRAWINGS OF HELMET

Cut helmet from old water tank, to size which will give sufficient head room. Hose and safety line should be about 50 feet long, and new. Bolts hold each weight.

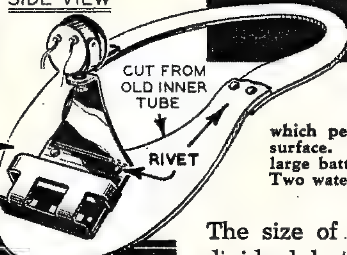
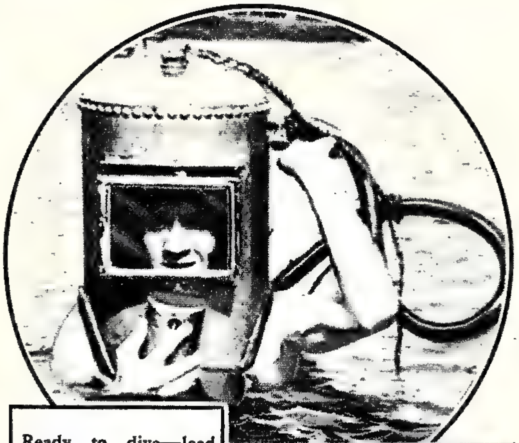

CUT FROM OLD INNER TUBE
LIGHT METAL FRAME HOLDS BATTERY
RIVET

FIG. 6 — DETAIL OF BREAST PLATE FOR BATTERY & TRANSMITTER



Ready to dive—lead weights sink helmet slowly when air is pumped in. No shoulder straps are needed.

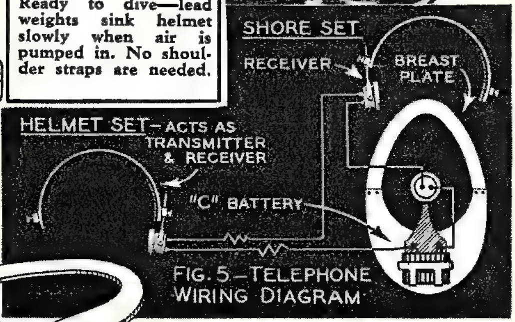

SHORE SET
RECEIVER
BREAST PLATE
HELMET SET—ACTS AS TRANSMITTER & RECEIVER
"C" BATTERY

FIG. 5—TELEPHONE WIRING DIAGRAM

Radio earphones act as both transmitter and receiver in this simple communication system which permits diver to give instructions to man at surface. A 4½-volt C battery supplies the power—large battery may be used if more volume is desired. Two waterproof wires are run from helmet to surface.

The size of the port depends upon the individual, but should be at least 6"x8". These cuts may be made either with a cold chisel or with a cutting torch. The latter is the more simple but it is also more expensive.

The window frame "B" is made as shown in Fig. 2, from heavy galvanized iron, and soldered into place. The frame "A" is made of the same material, but is made enough larger to fit over frame "B". Plate glass is used for the port glass and is held in place with some type of marine cement or ordinary aquarium cement obtainable at pet shops. The cement used should be thick and pasty, but should not harden too hard. The frame "A" is then soldered into place.

The shoulder padding is made from garden hose. The hose is split lengthwise and wired through small holes drilled around the base of the helmet, as shown in detail sketches, Fig. 4.

[*Continued on page* 124]

AMATEUR DIVING PRECAUTIONS

Unless you are a good swimmer, don't try diving.

Make only shallow dives until you have had some experience in walking under water with a weighted helmet.

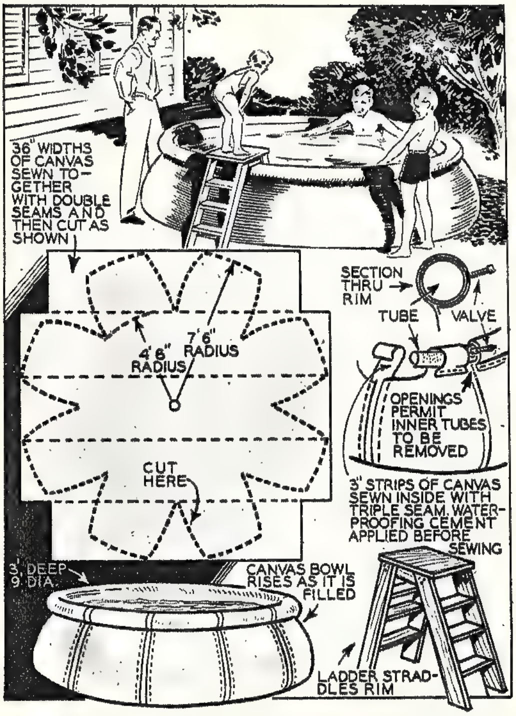
Be sure a good swimmer is always at hand in case of accident. The cold water may bring on cramps.

Use two safety ropes, one around your waist, the other attached to the helmet, and both tied to the air line at intervals. Both ropes and hose should be new.

Under ordinary circumstances, do not go deeper than 30 feet with this helmet. Deeper dives involve an element of danger, and are best made with regular diving suits.

If the water is rising in your helmet, call for more air. You can always push off the helmet and swim to the surface if the pumps stop or the air line breaks.

Backyard Swim Pool, Made of Canvas, Rolls Up Like Tent


36" WIDTHS OF CANVAS SEWN TOGETHER WITH DOUBLE SEAMS AND THEN CUT AS SHOWN
SECTION THRU RIM
TUBE
VALVE
7'6" RADIUS
4'6" RADIUS
OPENINGS PERMIT INNER TUBES TO BE REMOVED
CUT HERE
3" STRIPS OF CANVAS SEWN INSIDE WITH TRIPLE SEAM. WATER-PROOFING CEMENT APPLIED BEFORE SEWING
3' DEEP 9' DIA.
CANVAS BOWL RISES AS IT IS FILLED
LADDER STRADDLES RIM

Portable and leak-proof, this inexpensive canvas bowl sets up in any backyard. The bag holds shape when filled with water.

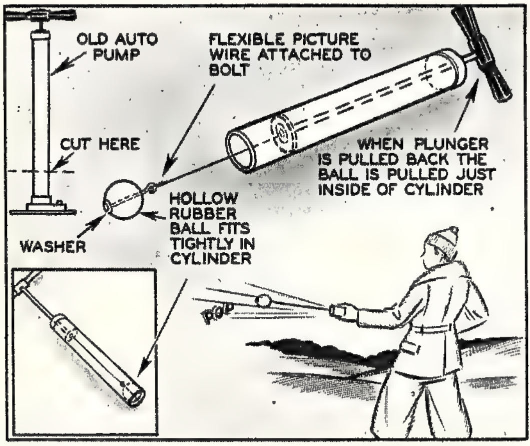
YOU can bring the old swimmin' hole to your backyard with this spacious canvas "bathing bowl" which rolls up like a tent when not in use.

Easily assembled, this timely project will command plenty of attention during the torrid summer months. Made of a 15-ft. square of waterproofed canvas, as shown in the diagram at the left, the bag when seamed is 3 ft. deep and 9 ft. in diameter. Eight 3-in. strips of cemented canvas help to reinforce the seams. The rim is a large hem containing inner tubes cut to size and with ends sealed. Openings in the hem permit removal of inner tubes when bag is put away in storage.

A small wooden step-ladder should be made just large enough to straddle the rim so that swimmers may enter or leave pool. If desired, a midget diving tower may be erected overhanging the edge of the pool. Because of shallow water, high dives should not be tried.

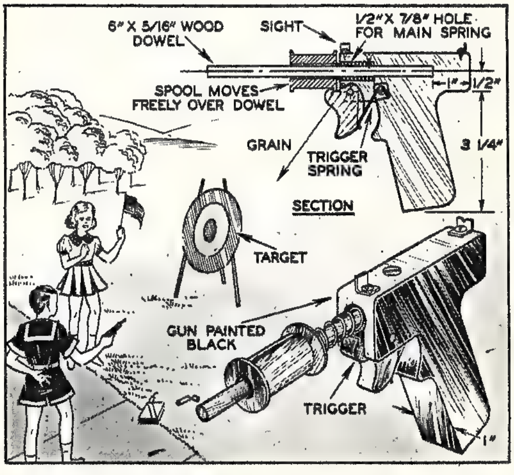
Tire Pump Makes Novel Pop Gun

A RAPID-FIRE pop gun can be constructed from a discarded tire pump by sawing off the cylinder above the outlet and attaching a hollow rubber ball to the plunger with a short piece of wire. The tightly fitting ball is forced out with a pop as the handle is pushed forward.


OLD AUTO PUMP
FLEXIBLE PICTURE WIRE ATTACHED TO BOLT
CUT HERE
WHEN PLUNGER IS PULLED BACK THE BALL IS PULLED JUST INSIDE OF CYLINDER
HOLLOW RUBBER BALL FITS TIGHTLY IN CYLINDER
WASHER
POP

Hollow rubber ball, fastened to plunger of revamped tire pump, gives loud report when pump handle is depressed.

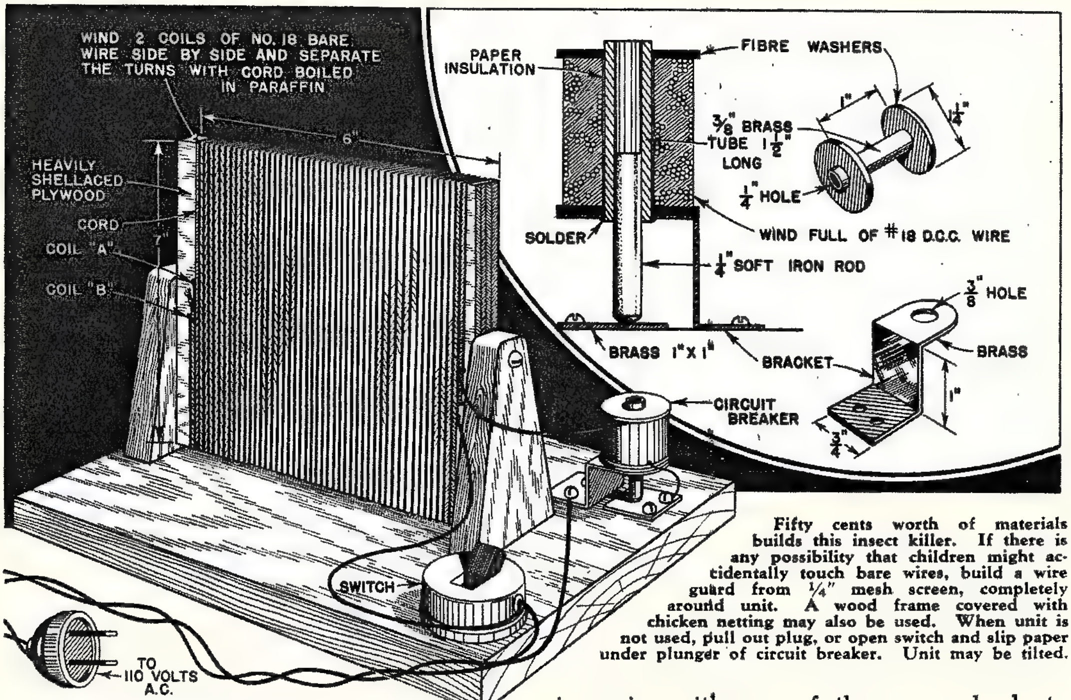
Toy Pistol Shoots Spool Bullets


6" X 5/16" WOOD DOWEL
SIGHT
1/2" X 7/8" HOLE FOR MAIN SPRING
SPOOL MOVES FREELY OVER DOWEL
1"
1/2"
GRAIN
TRIGGER SPRING
3 1/4"
SECTION
TARGET
GUN PAINTED BLACK
TRIGGER
1"

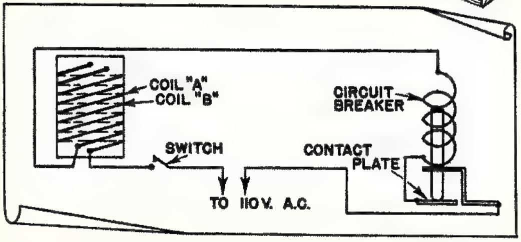
Here's a safe toy pistol for Fourth of July celebrators. Firing thread spools, the gun is claimed to be quite accurate.

UNLIKE most toy pistols, the hole in the "spool gun" shown above is in the bullet rather than the barrel. Employing discarded thread spools for projectiles, this novelty is safe for any child to use. The spool is slipped over a 5/16-in. dowel (a penny pencil will do) and is held by a notch in the wooden trigger. Pressure on the trigger releases a spring which forces spool off dowel. The trigger is cut from a ⅜-in. block of hardwood. The sights are bent to shape from thin sheet metal, the rear being ⅜-in. high and the front, $\frac{3}{16}$-in.

KILL FLIES With ELECTRIC Screen


WIND 2 COILS OF NO. 18 BARE WIRE SIDE BY SIDE AND SEPARATE THE TURNS WITH CORD BOILED IN PARAFFIN
6"
7"
HEAVILY SHELLACED PLYWOOD
CORD
COIL "A"
COIL "B"
PAPER INSULATION
FIBRE WASHERS
1"
1¼"
⅜" BRASS TUBE 1½" LONG
¼" HOLE
SOLDER
WIND FULL OF #18 D.C.C. WIRE
¼" SOFT IRON ROD
⅜" HOLE
BRASS 1"X1"
BRACKET
BRASS
1"
¾"
CIRCUIT BREAKER
SWITCH
TO 110 VOLTS A.C.

Fifty cents worth of materials builds this insect killer. If there is any possibility that children might accidentally touch bare wires, build a wire guard from ¼" mesh screen, completely around unit. A wood frame covered with chicken netting may also be used. When unit is not used, pull out plug, or open switch and slip paper under plunger of circuit breaker. Unit may be tilted.


COIL "A"
COIL "B"
CIRCUIT BREAKER
SWITCH
CONTACT PLATE
TO 110V. A.C.

This diagram shows how to connect home-made circuit breaker to electric fly killer. Solenoid bracket touches plunger.

by RAYMOND F. YATES

FLIES, wasps and other insect pests alighting on this simply made "electric chair" are electrocuted in a moment. By smearing a bit of honey over the wires without short circuiting them and setting the screen in a window, the house can be rid of flies in a few hours.

Two bare copper wires, separated by grocery string, are wound around a piece of plywood, and connected to the 110-volt A. C. house power lines. The bodies of insects crawling over the wires short circuit the system, the surge of current being strong enough to kill and throw off the insects at the same time. A simple circuit breaker is connected in series with one of the power leads to prevent serious short circuits, inasmuch as the wires are constantly exposed. Be sure to use plywood or some other non-warping insulating material for the form. Any warping of this piece will produce short circuits between the windings, possibly blowing the house fuses.

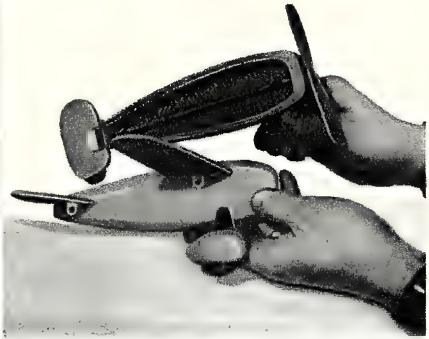
The cord which separates the No. 18 bare copper wires should first be boiled in paraffin, as untreated cord will absorb moisture and conduct current.

The unit may be made as large as desired, as current is drawn only when a fly is being electrocuted. Many will want to make one large enough to fit into a half-opened window.

Cockroaches and other crawling insects are killed by placing the unit in a horizontal position, near a pantry shelf, and building a small run-way up to the "hot" platform. Sprinkle over the wires anything sweet, which does not have too much moisture.

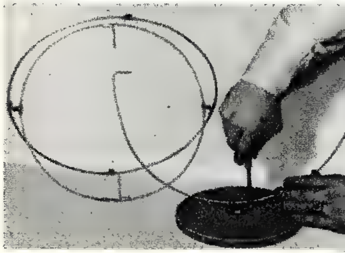
The circuit breaker is simply a solenoid constructed as shown, and wound full of No. 18 d.c.c. wire. The number of turns or the size of the coil are not important. The iron plunger fits loosely in the solenoid, and vibrates up and down until the short circuit is cleared. Do not use grease, as the plunger must make contact with the brass tube.

Model Planes Maneuver in Tilt-Whirl Cradle

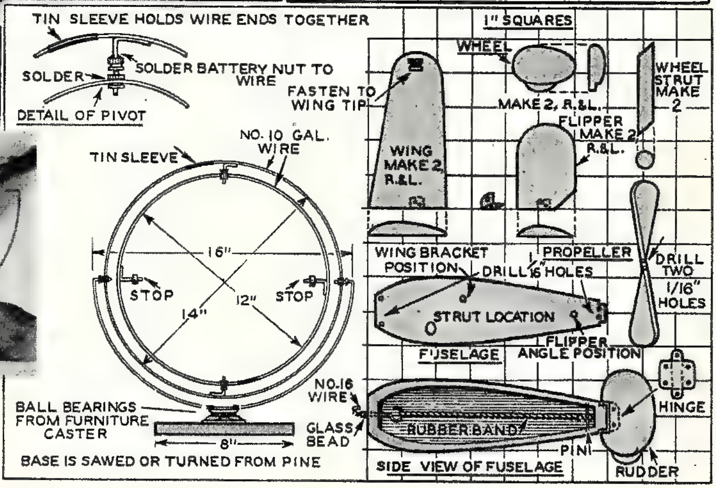


Fuselage sides are fastened to center part with screws. Whittle propeller from 1"x1"x5" balsa block. Make shaft from No. 16 music wire.

Set the rudder, flippers, and wings in any desired position, wind propeller, and watch this stunting airplane do everything a real plane will do.



The ball bearing mounting for the wire framework is a novel feature of this toy. Transfer sketches at right to paper ruled with 1" squares, to obtain model plane dimensions.


TIN SLEEVE HOLDS WIRE ENDS TOGETHER
SOLDER
SOLDER BATTERY NUT TO WIRE
DETAIL OF PIVOT
FASTEN TO WING TIP
NO. 10 GAL. WIRE
TIN SLEEVE
16"
STOP
12"
STOP
14"
NO. 16 WIRE
BALL BEARINGS FROM FURNITURE CASTER
GLASS BEAD
8"
BASE IS SAWED OR TURNED FROM PINE
1" SQUARES
WHEEL
MAKE 2, R.&L.
WHEEL STRUT MAKE 2
FLIPPER MAKE 2 R.&L.
WING MAKE 2 R.&L.
WING BRACKET POSITION
DRILL 1/16" HOLES
PROPELLER
DRILL TWO 1/16" HOLES
STRUT LOCATION
FLIPPER ANGLE POSITION
FUSELAGE
HINGE
RUBBER BAND
PIN
SIDE VIEW OF FUSELAGE
RUDDER

Cut rudder hinge from light aluminum, bending small tabs over rear end of fuselage, large tabs over rudder. Fasten to rudder with small brads used as rivets. Wing and flipper angles are also cut from aluminum, and fastened to body with single screws. Try placing this mounted model in the air stream of an electric fan, or on radiator of an auto.

A RUBBER-BAND powered model airplane of any type, mounted in this tilting, whirling, rolling cradle, will provide hours of keen amusement, and at the same time show just how all the different maneuvers of an airplane are carried out. When the rudder, flippers, and wings are set for a particular stunt and the motor wound, the model will respond just as faithfully as would one of the Navy's stunting *Hell Divers.* End over end spins, Immelmann turns, tail spins are all possible with this little toy.

First form the cradle from any stiff wire, closing the ends of the circles with tin sleeves soldered into position. Solder the right angled pivots at the positions shown in the sketches.

Saw off the legs from a ball-bearing furniture caster, and mount the bearing on a circular wood base. The semi-circular wire is soldered in the exact center of this bearing.

Ambroid battery nuts to the wing tips of your model plane, after determining the balance point, then spread apart the cradle to get the plane in position. If your model is larger or smaller than that shown here, change the size of the mounting correspondingly.

A monoplane model for this mounting may be carved from balsa in a few hours. Cut the body piece first, from a 1" thick board, cutting out the center to make room for the rubber band motor. Cut the other parts to the sizes indicated, rounding all edges.

Study the photographs and drawings carefully before assembling your model. Locate the wing pivot bearings in the exact center of balance of the model, to make end over end turns possible.

A Miniature Japanese Garden

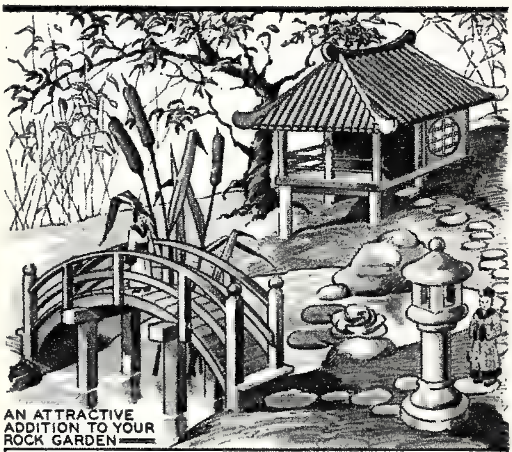
ANY small, neglected nook in your back yard can easily be transformed into this attractive miniature Japanese garden, with its high-arched bridge, charming stone lamp, fish pond, and cottage. In old Japan, where every inch of land is utilized, you will find these carefully planned gardens everywhere.

Windows of the cottage are criss-crossed with narrow strips of berry-box wood, over which is tacked a square of white silk, to create the effect of the paper *shoji* of Nippon.

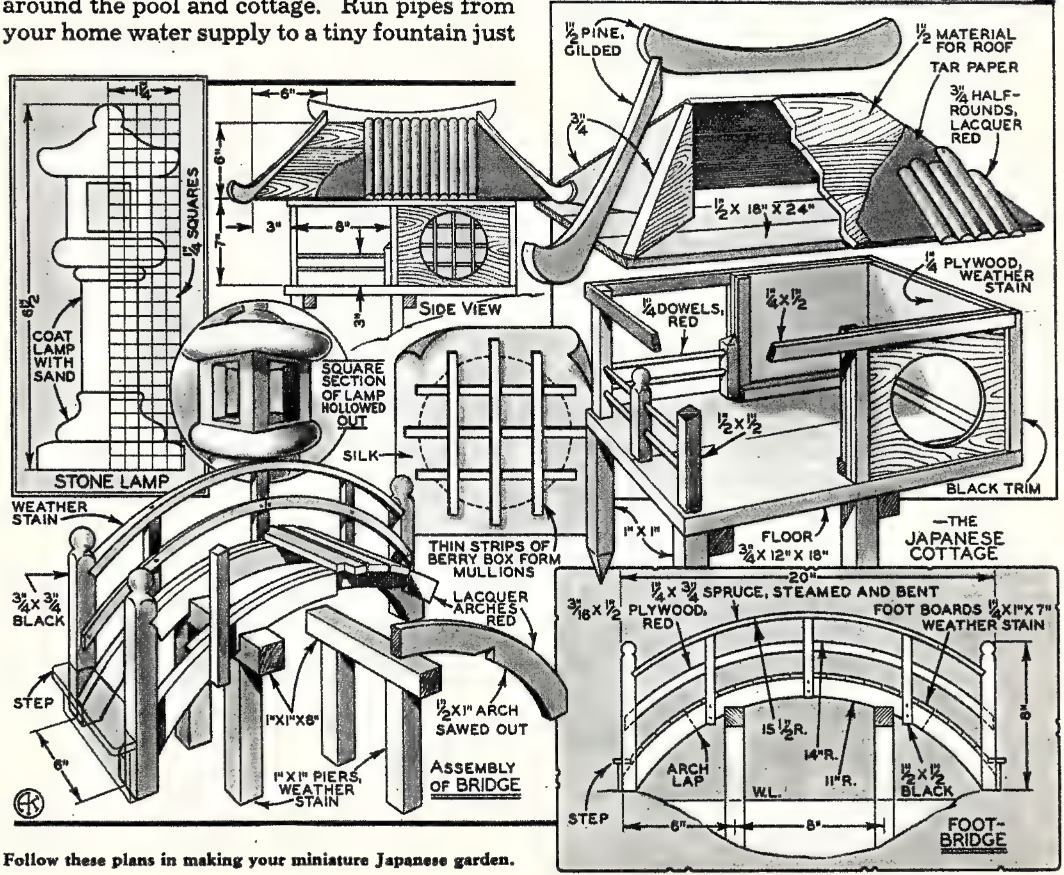
The bridge rails are steamed, then bent to shape and allowed to set before assembling with the other pieces. Red lacquer, touched up with black and gold, is an effective color scheme. The last coat should be a clear shellac, applied to all parts of the bridge.

Turn out the wood lamp on a lathe, carve out the lamp holder, apply gray paint or lacquer, a coat of marine glue, and finally sprinkle sand all over to give the stone effect.

Arrange moss, rocks, and dwarf plants around the pool and cottage. Run pipes from your home water supply to a tiny fountain just above a little rock waterfall, from which water can cascade down into the pool below. Your own ingenuity is the only limit to the possibilities of this garden.

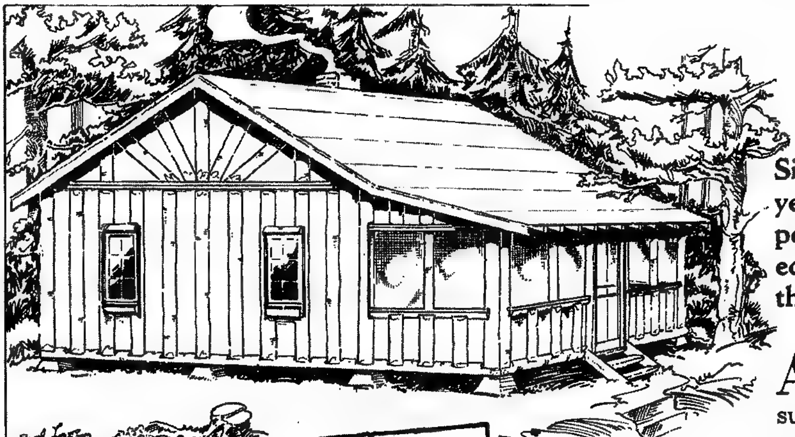


AN ATTRACTIVE ADDITION TO YOUR ROCK GARDEN


1 1/4"
6 1/2"
1/4" SQUARES
COAT LAMP WITH SAND
STONE LAMP
SQUARE SECTION OF LAMP HOLLOWED OUT
6"
6"
7"
3"
8"
3"
SIDE VIEW
SILK
THIN STRIPS OF BERRY BOX FORM MULLIONS
1/2" PINE, GILDED
3/4"
1/2 MATERIAL FOR ROOF
TAR PAPER
3/4 HALF-ROUNDS, LACQUER RED
1/2"X 18" X 24"
1/4 PLYWOOD, WEATHER STAIN
1/4 DOWELS, RED
1/4x1/2
1/2x1/2
BLACK TRIM
1"X1"
FLOOR 3/4"X 12" X 18"
—THE JAPANESE COTTAGE
WEATHER STAIN
3/4"X 3/4" BLACK
STEP
6"
1"X1"X8"
1"X1" PIERS, WEATHER STAIN
LACQUER ARCHES RED
1/2"X1" ARCH SAWED OUT
ASSEMBLY OF BRIDGE
20"
1/4"X 3/4" SPRUCE, STEAMED AND BENT
3/16"X 1/2" PLYWOOD, RED
FOOT BOARDS 1/4"X1"X7" WEATHER STAIN
8"
15 1/2"R.
14"R.
11"R.
ARCH LAP
W.L.
1/2"X 1/2" BLACK
STEP
6"
8"
FOOT-BRIDGE

Follow these plans in making your miniature Japanese garden.

A Semi-Log Cabin for

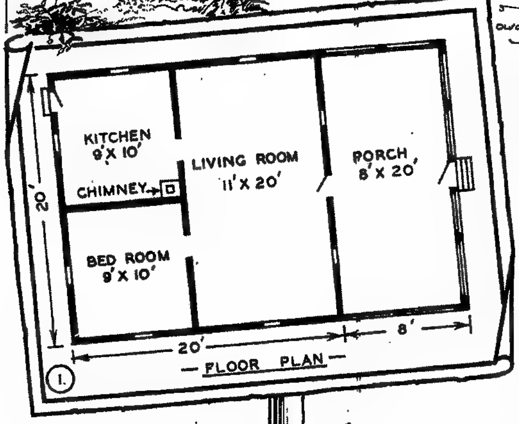


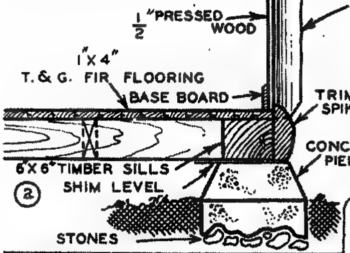
by
O. E. OLSON

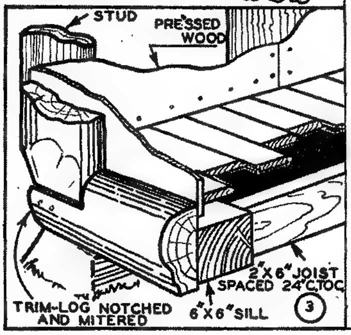
Simple to construct, yet pleasing in appearance, this cabin is economically ideal for that summer retreat.

ANYONE handy with tools can build this summer cabin. The semi-log trimming gives it a pleasant rustic appearance. The use of pressed wood panels greatly simplifies its construction and performs a double duty by providing a neat, smooth interior finish. The cabin is twenty by twenty-eight feet in size and has four rooms, including the porch.

It can be built at low cost, from $200 to $300, depending on location and the price of logs in the vicinity. The timber can be cut by the builder, reducing his expense. In that case, it is necessary to cut the logs and peel them a season ahead of time to allow time for drying. Logs, already peeled and seasoned, can usually be purchased in the


KITCHEN
9'X 10'
CHIMNEY
BED ROOM
9'X 10'
LIVING ROOM
11'X 20'
PORCH
8'X 20'
20
20'
8'
FLOOR PLAN
1.


1/2" PRESSED WOOD
SPLIT LOG STUD
1"X 4" T. & G. FIR FLOORING
BASE BOARD
TRIM-LOG SPLIT AND SPIKED TO SILL.
CONCRETE PIER.
6"X 6" TIMBER SILLS
SHIM LEVEL
2
STONES


STUD
PRESSED WOOD
2"X 6" JOIST SPACED 24" C. TO C.
TRIM-LOG NOTCHED AND MITERED
6"X 6" SILL
3

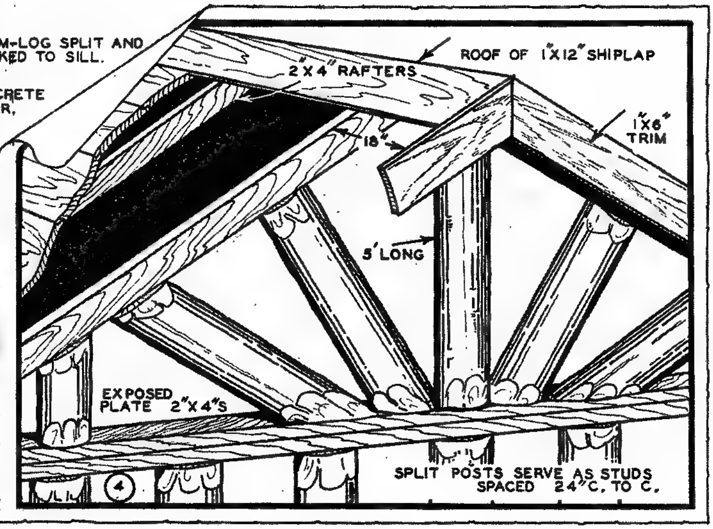
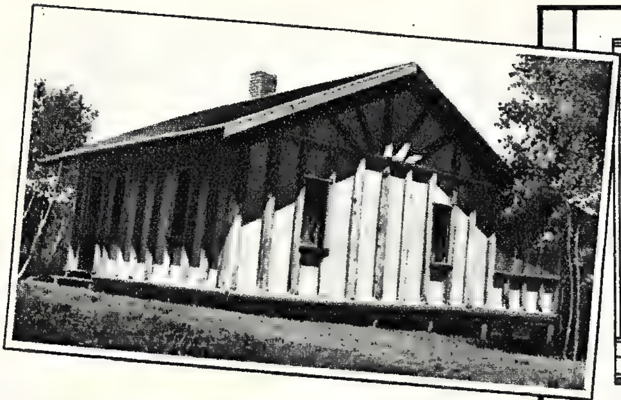

ROOF OF 1"X 12" SHIPLAP
2"X 4" RAFTERS
1"X 6" TRIM
18"
5' LONG
EXPOSED PLATE 2"X 4"S
SPLIT POSTS SERVE AS STUDS SPACED 24" C. TO C.
4

Fig. 1 shows floor plan of the cabin which can be changed to suit builder. The 2"x6" floor joists in Figs. 2 and 3 rest on a 6" square beam running down the center of the floor plan. It is advisable to use concrete piers under this beam also. The sunburst effect in Fig. 4 is an attractive feature, yet provides a sturdy support for the roof.

Your Vacation Home

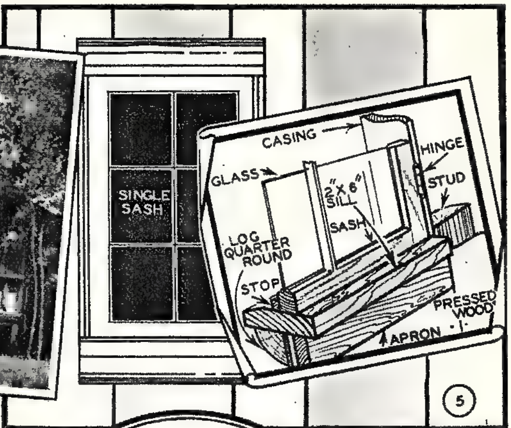


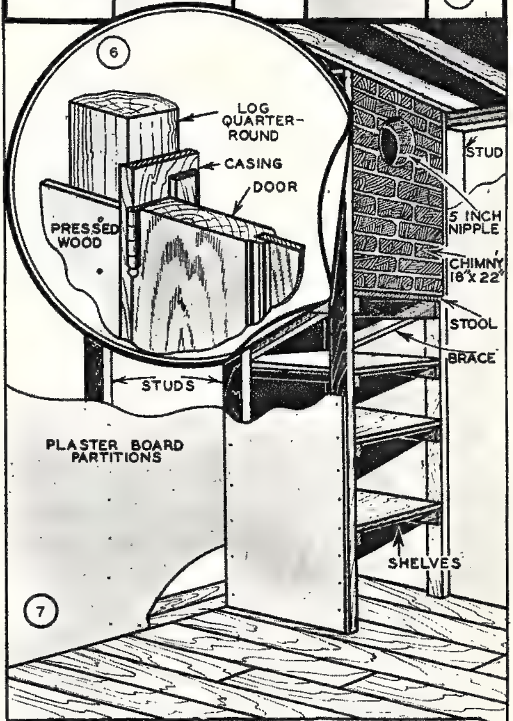
Here is a side view of the completed cabin, showing the sunburst roof supports and rear door from the kitchen.

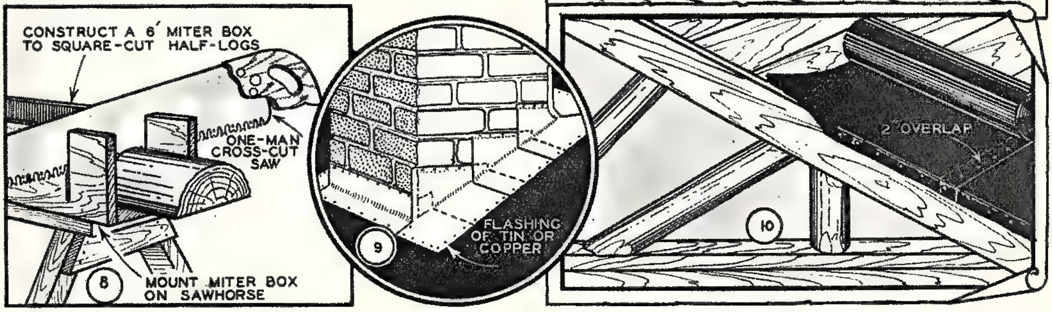
vicinity. Portable saw mills can also be found in the timber country. They can be brought to the cabin site to split the logs at a nominal cost. An experienced builder, with adequate help, can construct this cabin and have it ready for occupancy in a few days.

Approximately sixty well seasoned pine or cedar logs of 8-foot lengths are required for the construction of the cabin. These logs or posts should be selected for uniform size and straightness, 8″ butts being preferred.

With the material on location, start with the foundation. If the soil is light or sandy dig down about a foot and partly fill the hole with rocks, erect a shallow box for the upper form and pour in concrete. Make twelve such piers locating one directly under the chimney stool. If large rocks are plentiful and the ground firm, use boulders, well set, in place of concrete piers. Place 6″ by 6″ sills level on the foundation in such a manner as to leave room for the trim-log, as shown in Fig. 2. Rip off one edge of trim-log to allow at least

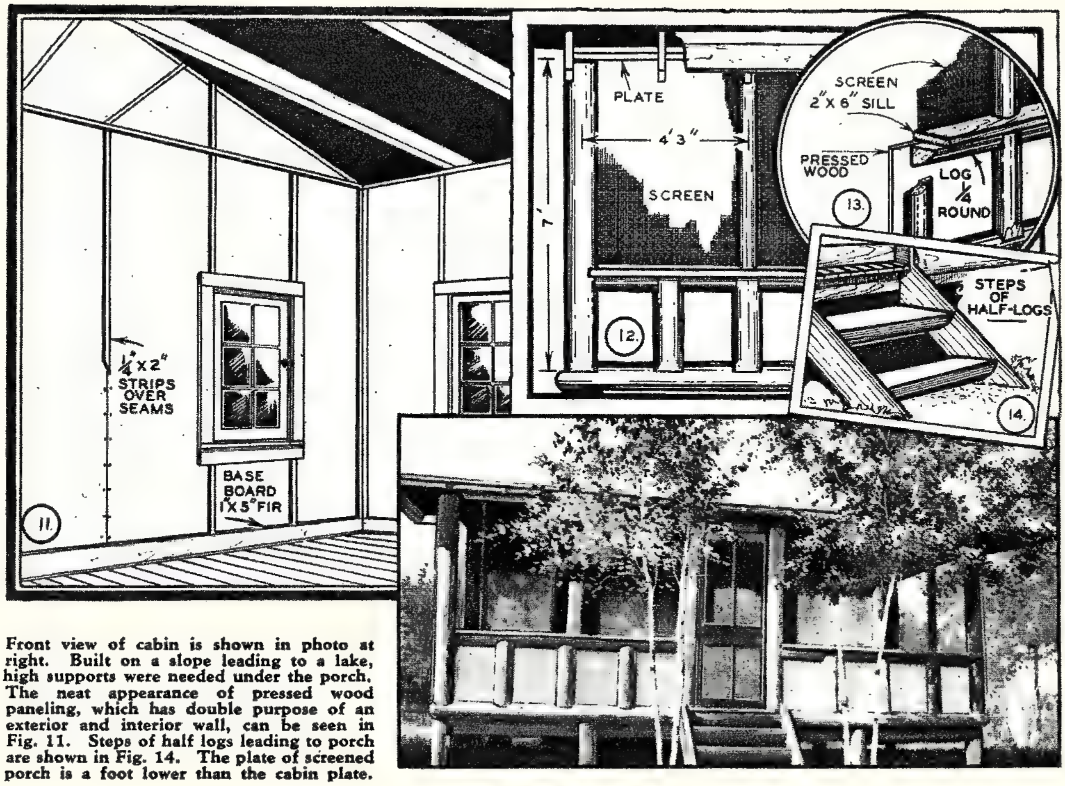

SINGLE SASH
CASING
HINGE
GLASS
2"X6" SILL
STUD
SASH
LOG QUARTER ROUND
STOP
PRESSED WOOD
APRON
5


6
LOG QUARTER-ROUND
CASING
DOOR
PRESSED WOOD
STUD
5 INCH NIPPLE
CHIMNY 18"x22"
STOOL
BRACE
STUDS
PLASTER BOARD PARTITIONS
SHELVES
7


CONSTRUCT A 6' MITER BOX TO SQUARE-CUT HALF-LOGS
ONE-MAN CROSS-CUT SAW
MOUNT MITER BOX ON SAWHORSE
8
FLASHING OF TIN OR COPPER
9
2" OVERLAP
10

By building the miter box in Fig. 8 square cutting of logs will be simplified. The chimney rests on a stool five feet above the floor. Shelving, built into the stool, provides pantry space in the kitchen. Lay roofing as shown in Fig. 10.

Single Sheets of Pressed Wood Used As Interior and Exterior Walls



Front view of cabin is shown in photo at right. Built on a slope leading to a lake, high supports were needed under the porch. The neat appearance of pressed wood paneling, which has double purpose of an exterior and interior wall, can be seen in Fig. 11. Steps of half logs leading to porch are shown in Fig. 14. The plate of screened porch is a foot lower than the cabin plate.

a two-inch seat on pier, then spike securely to sill. At intervals of 2', center to center, notch for butting in half-log studs. Join trim-log corners with a miter cut, as shown in Fig 2. Trim-logs should be large enough to extend above the sill. The joists of 2" by 6" material, spaced 18", center to center, are butted to the sills and rest on a central 6" by 6" beam. Spread rough boards over joists for temporary flooring.

To facilitate the square cutting of the half-log ends, construct a 6-foot miter box, as shown in Fig. 8. Cut studs to uniform 8' lengths and place in notches of the trim-log and cap with an exposed plate as shown in Fig. 4. Corner studs should fit edge to edge, as shown in Fig. 3. The porch plate is dropped one foot below this plate line to allow ample room for screening. Cut quarter-round portions of door studs before placing in position.

The rafters are spaced 18" center to center and extend with an overhang of 18". The roof is made of 1" by 12" shiplap, number two stock and should project 18" over the rafters at the end. Trim with 1" by 6", as shown in Fig. 4.

The sunburst effect in the gable ends, as shown in Fig. 4, is obtained by fitting in half-logs flush with inside edges of rafters and plate. This also provides a very substantial roof support.

Lay the roofing parallel to roof boards, as shown in Fig. 19, beginning at the bottom and working up, allowing an overlap of 2" with each successive strip. Care should be taken not to use roofing nails that extend through the shiplap, yet they should be long enough to hold securely.

The 1" by 4" fir flooring may now be put down. The reason for not laying the floor before was to eliminate the possibility of wetting by rain, but now the roof offers its protection. A saving can be made by using second grade flooring and selecting edge grain pieces to be used where the heaviest traffic is expected. Flat grain boards should be used where there will be, normally, little wear.

The door frame construction is very simple, as shown in Fig. 6, with hinges mortised into the outside frame in the conventional way. Place a temporary elevation strip on the

[*Continued on page* 126]

TOY WINDMILL Operates Comic FIGURES

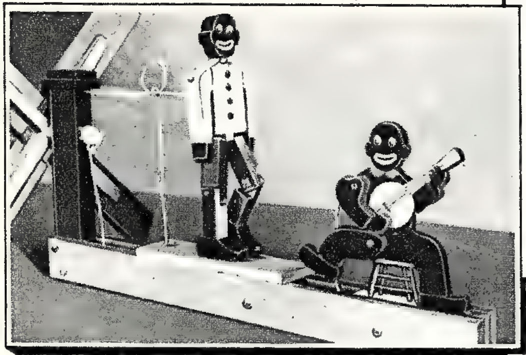
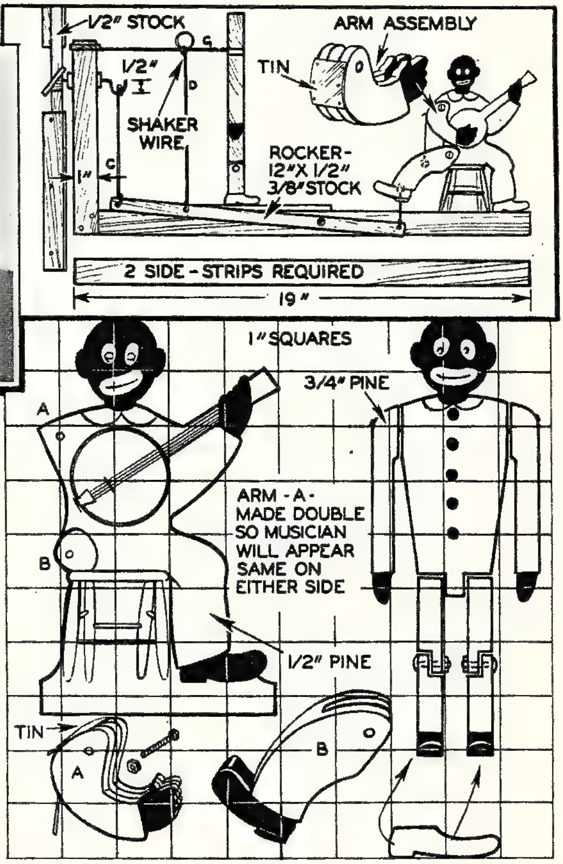


Photo above shows unique windmill toy which anyone can make. Diagram at right reveals manner of laying out and assembling parts. As windmill spins, limbs, connected to rocker arm, move in a life-like manner.



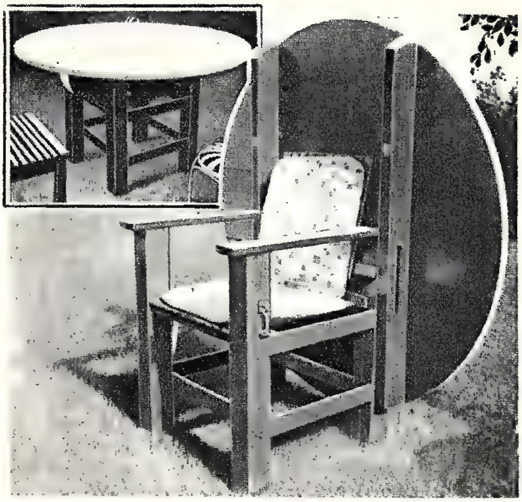
ANIMATED toy windmills are popular subjects. In the one shown above, the spinning windmill causes the tiny figures to dance and play. Despite its complicated action, the toy is really easy to make and will provide much amusement.

The 16-in. sails are made of cigar box wood, nailed to ½-in. arms. The blades spin on a wire axle which passes through the center of the propeller and upright standard. Hooked at one end, the axle is fastened to a 12-in. rocker, which controls the limb movements of the tiny figures by its up and down action. The wire connectors are cut from telephone wire and must be of the proper length to insure smooth action. Movement of the shaker wire causes the upright figure to dance while the banjo-strumming "darkie" taps his foot.

When completed, enamel the device with gay colors. Hands, feet and faces of the figures should be painted black, with white eyes and pink lips. Mount on rigid support where breeze will strike it.

Lawn Furniture Has Dual Use

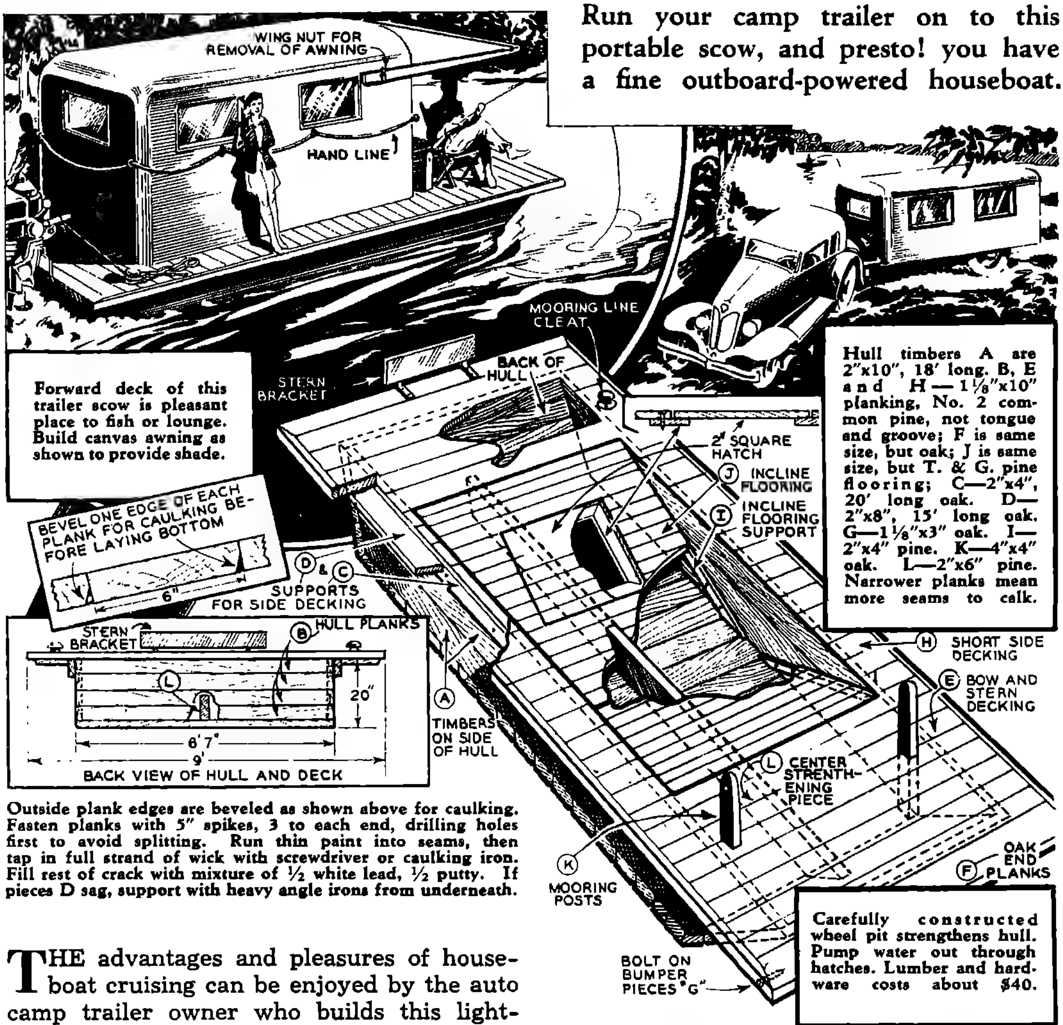
THIS combination chair and table for the lawn is a novel project which any workshop fan can build. The chair itself is constructed along simple lines and is made of wood of sturdy dimensions to counterbalance the table top when in a vertical position. Working on a hinge, the circular tabletop folds down on the arm rests of the chair and is locked in position. This fixture will seat eight people comfortably for a lawn luncheon. When used as a chair, the top folds back and serves adequately as a sunshade as well as backrest.



This odd lawn chair can be used as a comfortable seat or, by swinging down top, as a table, as seen in upper left.

Use Your Auto Trailer As A Houseboat

Run your camp trailer on to this portable scow, and presto! you have a fine outboard-powered houseboat.

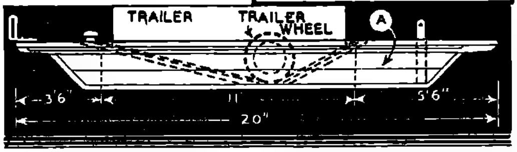

WING NUT FOR REMOVAL OF AWNING
HAND LINE
MOORING LINE CLEAT
STERN BRACKET
BACK OF HULL
2' SQUARE HATCH
J INCLINE FLOORING
I INCLINE FLOORING SUPPORT
BEVEL ONE EDGE OF EACH PLANK FOR CAULKING BEFORE LAYING BOTTOM
6"
D & C SUPPORTS FOR SIDE DECKING
STERN BRACKET
B HULL PLANKS
L
20"
6' 7"
9'
BACK VIEW OF HULL AND DECK
A TIMBERS ON SIDE OF HULL
H SHORT SIDE DECKING
E BOW AND STERN DECKING
L CENTER STRENTHENING PIECE
K MOORING POSTS
OAK END F PLANKS
BOLT ON BUMPER PIECES "G"

Forward deck of this trailer scow is pleasant place to fish or lounge. Build canvas awning as shown to provide shade.

Hull timbers A are 2"x10", 18' long. B, E and H — 1⅛"x10" planking, No. 2 common pine, not tongue and groove; F is same size, but oak; J is same size, but T. & G. pine flooring; C—2"x4", 20' long oak. D—2"x8", 15' long oak. G—1⅛"x3" oak. I—2"x4" pine. K—4"x4" oak. L—2"x6" pine. Narrower planks mean more seams to calk.

Outside plank edges are beveled as shown above for caulking. Fasten planks with 5" spikes, 3 to each end, drilling holes first to avoid splitting. Run thin paint into seams, then tap in full strand of wick with screwdriver or caulking iron. Fill rest of crack with mixture of ½ white lead, ½ putty. If pieces D sag, support with heavy angle irons from underneath.

Carefully constructed wheel pit strengthens hull. Pump water out through hatches. Lumber and hardware costs about $40.


TRAILER
TRAILER WHEEL
A
3' 6"
11'
5' 6"
20"

Side view of hull of scow showing how wheels fit into pit.

THE advantages and pleasures of houseboat cruising can be enjoyed by the auto camp trailer owner who builds this lightweight scow type hull.

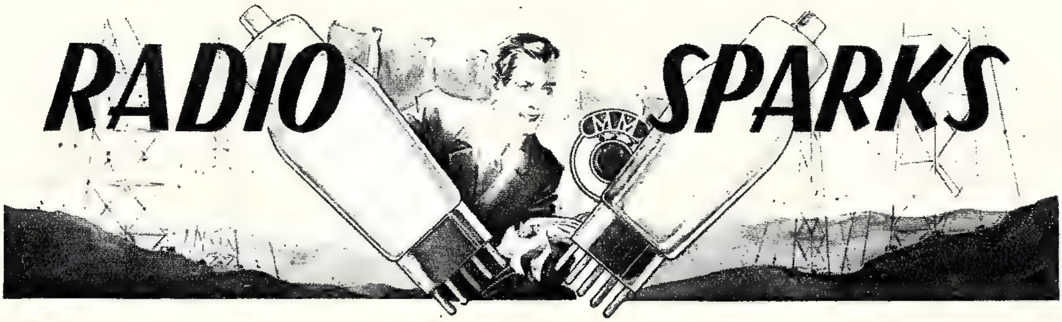
Invariably it is the out-of-the-way spots on small lakes and rivers that afford the best fishing. It is for waters like these, reached only by boat, that this trailer-houseboat combination is ideal. With a 5 h. p. outboard motor fastened on the stern, the loaded boat will do around 5 miles an hour.

When you tire of a certain lake, simply haul the trailer off the boat, and hook it behind the auto once more. The hull can be skidded out of the water by truck, jacked up, loaded and hauled to the new location.

While the hull dimensions given here are for an average-size trailer 11 feet long and 6 feet wide, it is a simple matter to increase the size of the boat for a larger trailer. Every effort should be made to keep down the weight in order to simplify transportation.

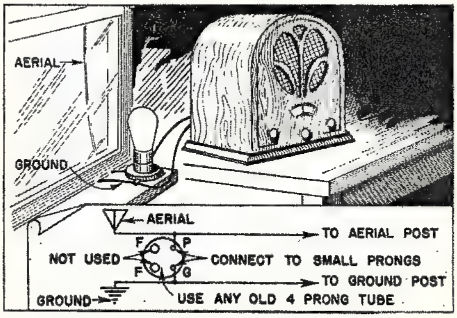
The secret of this design lies in the well or pit into which the trailer wheels drop, allowing the cabin to rest on the deck.

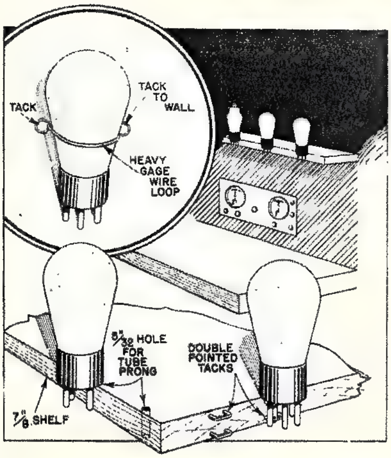
Build the hull upside down on a level spot, assembling the timbers with ½" diameter bolts. Smear the edges of all timbers with white lead, and lay in two strands of candle wick or heavy cord before pulling up on the bolts. This gives a strong, water-tight joint.


RADIO SPARKS

Lightning Arrester Made from Old Radio Tube Glows During Storms

ANOTHER job has been found for the burned-out radio vacuum tube. Mount the tube in a socket, connect the plate terminal to the aerial of your radio set, and the grid terminal to the radio ground. The tube may be mounted inside the radio set, but a better way is to set it just inside the window, on the sill. During an electrical storm each discharge can be seen. An approved arrester must be used outside the house to comply with fire underwriter's requirements.—Marvin I. Nolan.


AERIAL
GROUND
AERIAL
TO AERIAL POST
NOT USED
F
P
CONNECT TO SMALL PRONGS
F
G
TO GROUND POST
GROUND
USE ANY OLD 4 PRONG TUBE

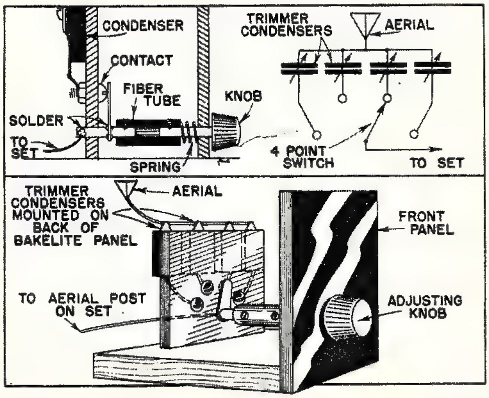

TACK
TACK TO WALL
HEAVY GAGE WIRE LOOP
5/32 HOLE FOR TUBE PRONG
DOUBLE POINTED TACKS
7/8" SHELF

Keep Extra Radio Tubes On Workbench Shelf

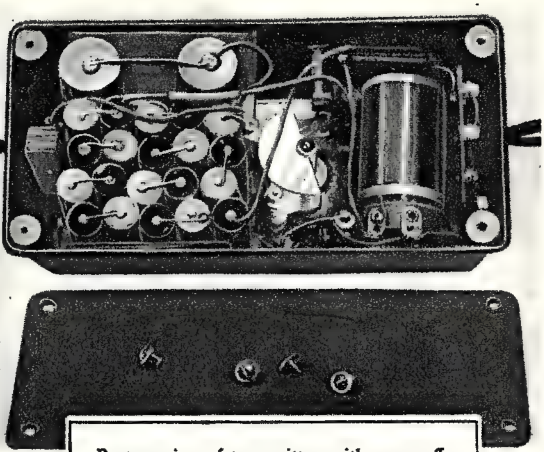
THE problem of keeping extra radio tubes where they are not easily broken, yet instantly available for experimental work, can be solved in a number of different ways. If you have a workbench with a back board, add an extra shelf about two inches wide and ⅞″ thick, running the full length of the bench. About two inches apart along the outer edge of this shelf, and ⅜″ in from the edge, drill $\frac{5}{32}$″ holes as shown in the sketch. Slip one prong of each radio tube into a hole, selecting that prong which will allow the tube number to show. Double pointed brads pounded into the side of a similar shelf, one atop the other, are used in exactly the same way. Where a shelf is impractical, simply make loops of wire, fasten along the wall, and slip in your tubes.—Oscar Hanssen.

Band Spread Condenser Kink for S. W.

RATHER than adjust the antenna trimmer condenser of a short wave set for band spread each time a plug-in coil is changed, use one trimmer condenser for each coil, with a selector switch to change from one to the other when coils are changed. Each condenser is set for a particular coil once, and wired up to the switch tap for that coil. Mount the condensers as shown. Home-made trimmer condensers will work nicely here once they are adjusted. A fiber tube in the switch shaft eliminates body capacity effects—Myrl O. Lemley.

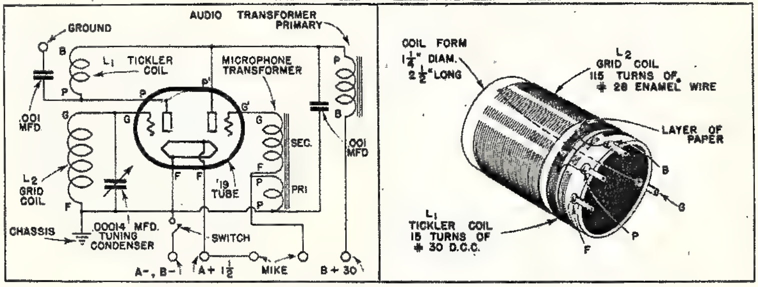

CONDENSER
CONTACT
FIBER TUBE
KNOB
SOLDER
TO SET
SPRING
TRIMMER CONDENSERS
AERIAL
4 POINT SWITCH
TO SET
TRIMMER CONDENSERS MOUNTED ON BACK OF BAKELITE PANEL
AERIAL
FRONT PANEL
TO AERIAL POST ON SET
ADJUSTING KNOB

One-tube TRANSMITTER Uses Bread Pan as Chassis



Bottom view of transmitter, with cover off.

Thomas A. Blanchard, 19-year-old inventor, writer of MM radio features, is holding his bread pan transmitter, smallest radio station in world. Filament switch is at left end of pan, tuning dial at top. Telephone coils were used here in place of audio transformer and microphone transformer; you may have to get a larger pan for standard radio parts. Circuit diagram and coil construction are at right. Wind grid coil first, place layer of paper over end, then wind tickler coil. Use carbon "mike."


AUDIO TRANSFORMER PRIMARY
GROUND
B
L_1 TICKLER COIL
MICROPHONE TRANSFORMER
P
P
P'
G'
.001 MFD
G
G
G
SEC.
B
.001 MFD
L_2 GRID COIL
F
F
F
'19 TUBE
F
P
PRI
P
CHASSIS
.00014 MFD. TUNING CONDENSER
SWITCH
A−, B−
A+ $1\frac{1}{2}$
MIKE
B + 30
COIL FORM $1\frac{1}{4}$" DIAM. $2\frac{1}{2}$" LONG
L_2 GRID COIL 115 TURNS OF # 28 ENAMEL WIRE
LAYER OF PAPER
B
G
L_1 TICKLER COIL 15 TURNS OF # 30 D.C.C.
P
F

VOICE and music programs can be broadcast through your own radio receiver with this midget one-tube transmitter, the world's smallest radio station. Weighing less than two pounds complete with batteries when ready to go "on the air," the entire unit fits into a five-cent bread pan measuring less than 2"x4"x7" in size.

Two small size flashlight cells connected in parallel supply 1½ volts, which is sufficient for filament power. Twenty of the pencil-type flashlight cells connected in series give 30 volts for the plates; some builders will prefer to use 45 volts, however, obtained from a midget B battery, to gain more volume.

Line the inside of the bread pan with insulating paper or cardboard. Solder threaded brackets into each corner, to which the heavy fiber or wood cover can be fastened. This cover keeps the batteries in position.

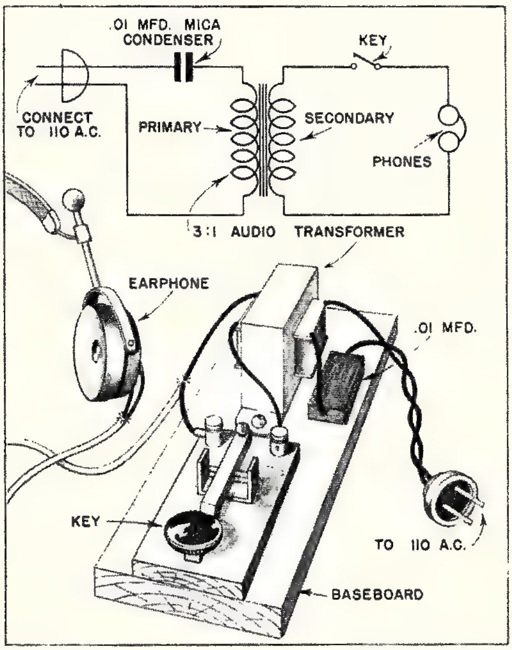
Mount the parts as close together as possible in one end of the pan, and connect as indicated in the circuit diagram. The socket connections for the type '19 tube may be obtained from any radio tube manual or chart. Mount the coil with a small bracket, being sure that it will clear the plates of the midget tuning condenser.

In operating this set, the broadcast receiver is set at a point where no stations are heard, the volume is turned on full, and the transmitter dial turned until a squeal is heard. You will have to tune your broadcast set to the lower part of the broadcast band, between 1300 and 1500 kilocycles; if a larger variable condenser is used in the transmitter, however, the entire band may be covered. Once the two sets are tuned, you can operate the transmitter from any room in the house.

A good single button carbon microphone, together with a microphone transformer, are required. Radio supply houses sell good hand microphones, suitable for this set, for less than two dollars.

This set is not recommended for use as a short wave transmitter.

Simple Code Practice Set Operates from 110-Volt A. C. Line


.01 MFD. MICA CONDENSER
KEY
CONNECT TO 110 A.C.
PRIMARY
SECONDARY
PHONES
3:1 AUDIO TRANSFORMER
EARPHONE
.01 MFD.
KEY
TO 110 A.C.
BASEBOARD

Code learning is easy with this simple practice set. Headphones and the code key are connected in series as shown.

NO BATTERIES or radio tubes are required in this simple code practice set, and the current drawn from the house power lines is so small that it will hardly turn the electric meter.

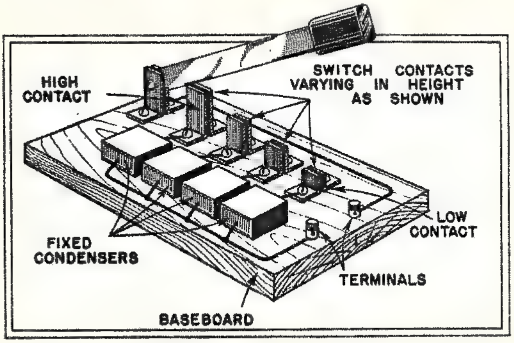
From some old battery radio set get a good audio transformer of 3:1 or 5:1 ratio. Test both windings for continuity, to be sure neither is burned out, then connect the primary in series with a fixed mica condenser of about .01 mfd. size and an extension cord of convenient length.

Headphones and a code practice key are connected in series across the secondary winding. The parts may be mounted on a small board as shown, or built into a neat little cabinet, with a plug jack for the phones.

A home-made key will work nicely with this practice set, but it should have the same "feel" as a commercial key to give you the most benefit from code practice.

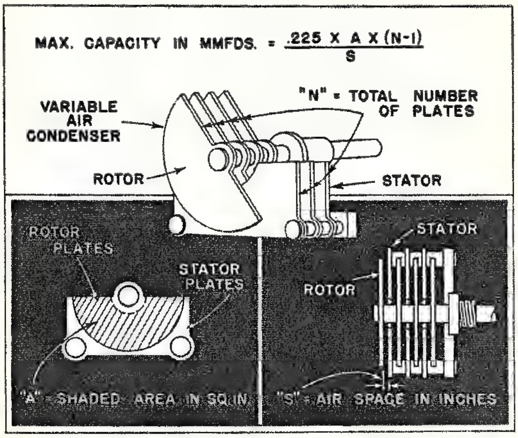
Mounting for Fixed Condensers

FOR experimental work a bank of fixed condensers mounted so any one of a number of different capacities may be obtained by changing the setting of a knife switch, will prove very handy. Mount a long single blade from an old switch on a small baseboard as shown, and mount switch contacts of different heights just under it. As the switch arm is pressed down, more condensers are connected in parallel. The same switching arrangement may be used with resistors, but here the combined resistance will always be less than that of any one resistor.


HIGH CONTACT
SWITCH CONTACTS VARYING IN HEIGHT AS SHOWN
LOW CONTACT
FIXED CONDENSERS
TERMINALS
BASEBOARD

Total capacity between the terminals of this bank condenser is the sum of capacities which are switched into the circuit.

Calculating Condenser Capacities

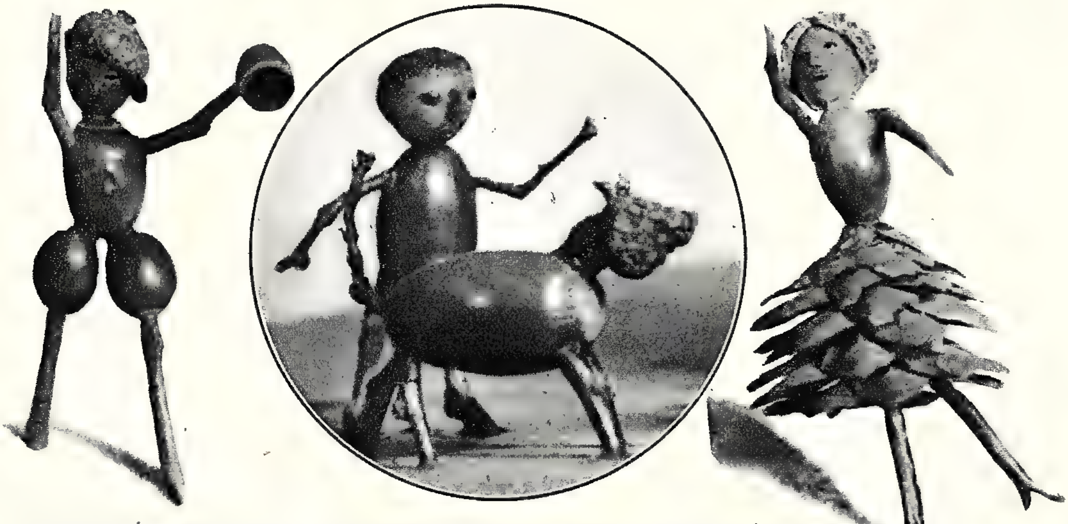

MAX. CAPACITY IN MMFDS. = .225 X A X (N-1) / S
VARIABLE AIR CONDENSER
"N" = TOTAL NUMBER OF PLATES
ROTOR
STATOR
ROTOR PLATES
STATOR PLATES
STATOR
ROTOR
"A" = SHADED AREA IN SQ. IN.
"S" = AIR SPACE IN INCHES

Variable condenser size formula is given above. Since spacing S and plate thickness are usually same, S may be calculated by measuring distance between outside plates of condenser.

THE capacity of a variable condenser depends upon the number of stator and rotor plates, the area that they mesh, and the spacing between the plates. The formula given here for calculating the maximum capacity in micro-microfarads (1000 mmfd.=1 mfd.=1 microfarad.) of any size variable condenser will be found very handy. Measurements can be made with ordinary ruler.

The area A is roughly the area of the rotor plates; it can be computed if they are semicircular, and estimated if they are shaped for straight line frequency operation.

MOLD ACORNS INTO NOVEL FIGURES



Dr. Rolland R. Jones, Minneapolis dentist, spends his leisure moments converting matched acorns into the tiny figures seen above. Only sealing wax and wire strands hold the limbs together. The types of models which can be produced depend entirely upon the ingenuity of the maker.

LIFE-LIKE figures can be formed from acorns with little more than a sharp knife, some sealing wax and a few short lengths of wire. There is no end to the variety of subjects which can be assembled—dogs, boys, dancing girls, co-ed cheer leaders and even a full squad of football players, if you have the necessary patience. Artistic skill helps, of course, but special talent is not necessary.

Only carefully selected nuts are used for the head, body and upper parts of the legs when making human characters. Thin wires, passing through the center of each acorn, hold the body members together. Melted sealing wax poured in the joints gives them rigidity.

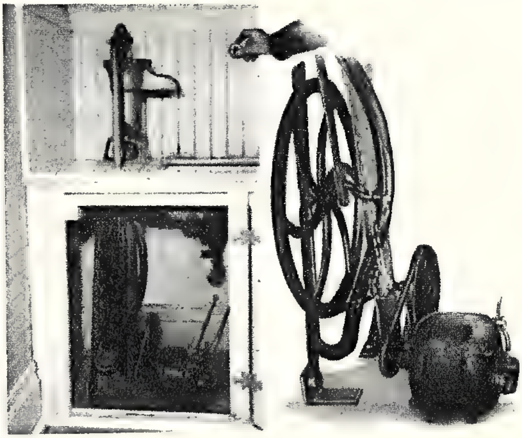
The arms and legs of the acorn men and women are cut from small oak twigs containing a tiny crotch which may be fashioned into the heel and toe of the foot. Caps or hats consist of acorn tops while pine cones or an extra large acorn, hollowed inside, provide milady with her modern dress.

Eyes, nose and mouth are cut into the head and molded with colored wax. Red wax may be used for the lips, flesh for the nose and blue and white for the eyes. A heated piece of wire is handy for making indentations.

The various models can be mounted in attractive layouts on discarded strips of linoleum simply by dipping the feet in hot paraffin and holding in position until the wax has cooled. Approximately two hours are required to assemble an acorn figure.

Cistern Pump Is Driven By Motor

WHERE running water is not available, in the home, the drudgery of pumping by hand can be eliminated by hooking up a ¼-H. P. motor to a large wheel which controls the rocker arm and pump. The assembly consists of a drive wheel, rocker arm and rod, obtainable from an old foot-operated sewing machine. The rod from the driving mechanism replaces the pump handle and the motor is geared down to reduce the fast speed. The complete mechanism is hidden from view by cupboard doors which enclose it.

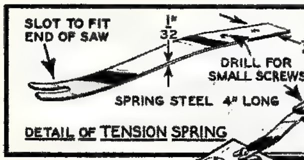


This home-made electrical contrivance for operating the kitchen pump fits under the sink and was built at small cost. Method of transmitting the power is shown at right above.

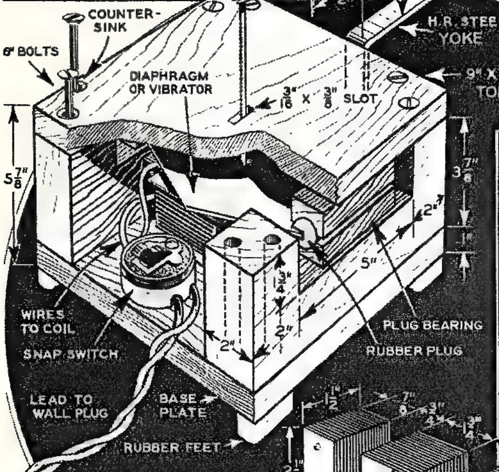
ELECTROMAGNET Drives VIBRATING JIG SAW

ONE of the most useful of all power tools for the home workshop, yet perhaps the easiest to make, is the vibrator type electric jig saw. You may use such a saw to cut intricate patterns in wood as thick as ½-inch, or as thin as $\frac{1}{16}$-inch. The great speed at which the saw travels provides smooth and accurate cuts. With no rotating parts, a jig saw of this type should last indefinitely.

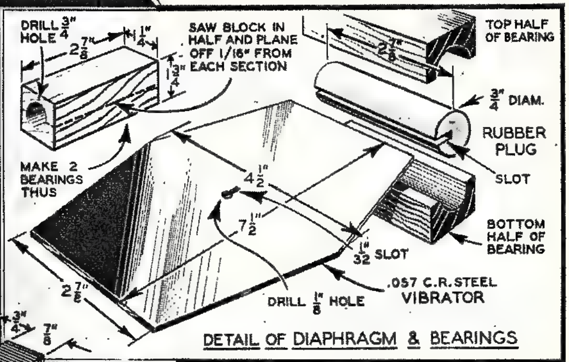
Mount saw on solid support to prevent excessive vibration. Coil specified will draw about 200 watts at 110 volts, 60 cycles. Use rubber feet.


SLOT TO FIT END OF SAW
1/32"
1/2"
DRILL FOR SMALL SCREWS
SPRING STEEL 4" LONG

DETAIL OF TENSION SPRING

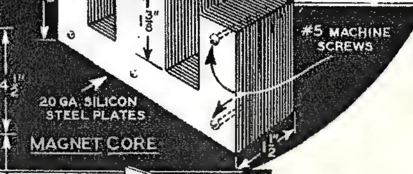

1/4"
1"
8"
4 1/8"
1 1/2"
H.R. STEEL YOKE
COUNTER-SINK
6" BOLTS
DIAPHRAGM OR VIBRATOR
3/16" X 3/8" SLOT
9" X 9" X 1" TOP PLATE
5 7/8"
3 7/8"
1"
2"
5"
1 3/4"
2"
2"
WIRES TO COIL
SNAP SWITCH
PLUG BEARING
RUBBER PLUG
LEAD TO WALL PLUG
BASE PLATE
RUBBER FEET

GENERAL ASSEMBLY

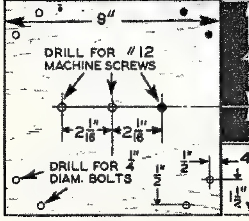

DRILL 3/4" HOLE
2 7/8"
1 1/4"
1 3/4"
SAW BLOCK IN HALF AND PLANE OFF 1/16" FROM EACH SECTION
2 7/8"
TOP HALF OF BEARING
3/4" DIAM.
RUBBER PLUG
SLOT
MAKE 2 BEARINGS THUS
4 1/2"
7 1/2"
1/32" SLOT
BOTTOM HALF OF BEARING
2 7/8"
DRILL 1/8" HOLE
.057 C.R.STEEL VIBRATOR

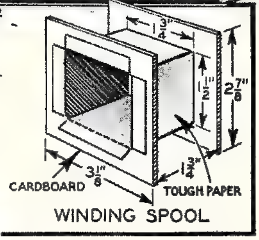
DETAIL OF DIAPHRAGM & BEARINGS

Make winding spool as shown, fastening pieces with ambroid cement. Insert wood block temporarily, as stiffener, then wind on 350 turns of No. 18 B&S double cotton covered copper wire. Make small hole near center of end piece to bring out inner lead. Coil slips over center leg of magnet core.

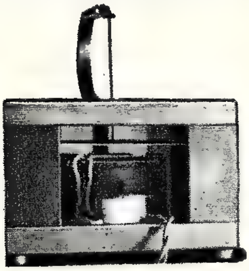

1 1/2"
7/8"
3/4"
1 3/4"
3/4"
7/8"
2 1/2"
1 3/8"
#5 MACHINE SCREWS
20 GA. SILICON STEEL PLATES
1 1/2"

MAGNET CORE


9"
DRILL FOR #12 MACHINE SCREWS
4 1/2"
2 1/16"
2 1/16"
DRILL FOR 1/4" DIAM. BOLTS
1/2"
1/2"
4 1/2"
1 1/2"


1 3/4"
1 1/2"
2 7/8"
1 3/4"
3 1/8"
CARDBOARD
TOUGH PAPER

WINDING SPOOL



Make electro-magnet from sheet silicon steel, or use old radio transformer laminations. Drill and tap core for 1½" long, No. 12 screws.

An electro-magnet attracts and releases a metal diaphragm to which is attached a saw blade. A flat steel spring supports and gives necessary tension to the upper end of the saw blade. With the unit adjusted properly, the stroke will be about ⅝-inch.

The speed of this saw depends upon the frequency of the A. C. power used, as the magnet is energized and de-energized twice for each cycle. Thus there will be 120 strokes per second when 60 cycle power is used for the electro-magnet.

Completing

by SAM S. RABL
Naval Architect

Here is a boat that will meet the needs of inland water sailors. Her four designs provide a selection that answers all purposes.

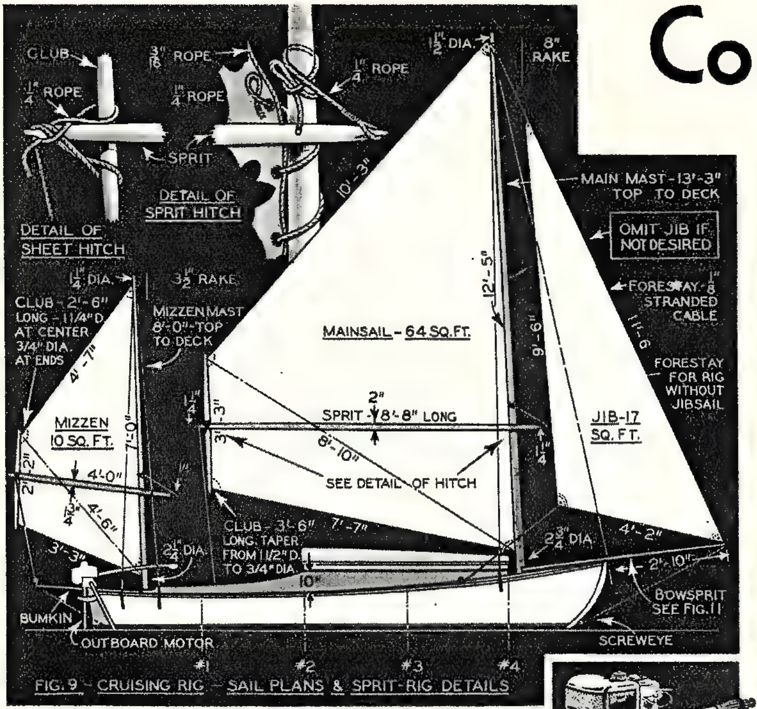

CLUB
3/16" ROPE
1/4" ROPE
1/4" ROPE
1/4" ROPE
SPRIT
DETAIL OF SPRIT HITCH
DETAIL OF SHEET HITCH
1 1/2" DIA.
8" RAKE
10'-3"
MAIN MAST-13'-3" TOP TO DECK
OMIT JIB IF NOT DESIRED
FORESTAY-1/8" STRANDED CABLE
11'-6
FORESTAY FOR RIG WITHOUT JIBSAIL
1 1/4" DIA.
3 1/2" RAKE
CLUB-2'-6" LONG-1 1/4" D. AT CENTER 3/4" DIA. AT ENDS
MIZZEN MAST 8'-0" TOP TO DECK
4'-7"
MAINSAIL-64 SQ. FT.
12'-5"
9'-6"
MIZZEN 10 SQ. FT.
7'-0"
2"
SPRIT 8'-8" LONG
1 1/4"
3"
3"
8'-10"
JIB-17 SQ. FT.
1 1/4"
2 1/2"
4'-0"
1"
SEE DETAIL OF HITCH
1 3/4"
4'-6"
2 1/2"
3'-3"
2 1/4" DIA.
CLUB-3'-6" LONG, TAPER FROM 1 1/2" D. TO 3/4" DIA.
7'-7"
2 3/4" DIA.
4'-2"
10"
2'-10"
BOWSPRIT SEE FIG. 11
BUMKIN
OUTBOARD MOTOR
SCREWEYE
#1
#2
#3
#4

FIG. 9 - CRUISING RIG - SAIL PLANS & SPRIT-RIG DETAILS

Drawing above shows Nomad as a ketch rigged auxiliary cruiser with details of the spars, rigging, sails and sprit hitch. The cabin may be made longer than that shown above.

PART II

NOMAD, the boat that combines four designs in one, will appeal to every inland water sailor. Last month in Part I complete constructional details were given for the framework and planking of all four types of *Nomad*—racing sloop, ketch auxiliary cruiser, outboard cruiser, and rowboat.

This month all remaining details will be covered including the hollow mast and flexible boom of the racing sloop, the cruising rig, decking, rudder, folding cabin for the cruiser, sails and the novel bailing bag.

Using cheap materials *Nomad,* as a racing sloop or auxiliary cruiser, can be built for approximately $100. Custom built of the very best materials in a professional boat yard, the cost will probably come to $300.

After the planking has been completed and the intermediate frames are in place, the deck beams are put in position as shown in Fig. 15. The beams, ½" by 2¼", are cut to a twelve foot radius. At the mast 1" by 2½" frames are used. The beams are spaced at every main and intermediate frame and are fastened at the clamp in the same manner as the bottom intermediate frames are fastened at the chine (see Fig. 3, Part I).

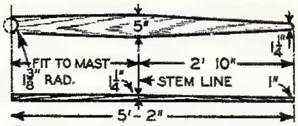

5"
1 1/4"
FIT TO MAST 1 3/8" RAD.
1 1/4"
2' 10"
STEM LINE
1"
5'-2"

FIG. 11 - DETAIL OF NOMAD'S BOWSPRIT

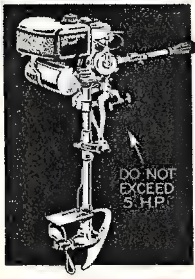
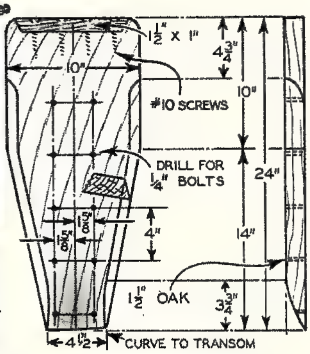
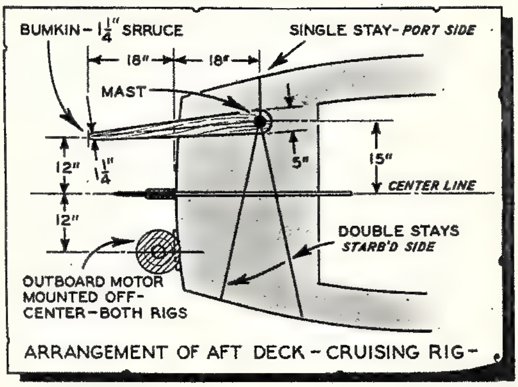

DO NOT EXCEED 5 H.P.

FIG. 10 - DETAIL OF THE OUTBOARD MOTOR MOUNT
NOTE:—FIT REINFORCING BRACKET INSIDE OF THE HULL


1 1/2" x 1"
4 3/4"
10"
10"
#10 SCREWS
DRILL FOR 1/4" BOLTS
24"
1 5/8"
5/8"
4"
14"
1 1/2" OAK
3 3/4"
4 1/2"
CURVE TO TRANSOM

In either the ketch rigged cruiser or outboard cruiser designs, do not use a motor over five h.p. If you plan to use a motor as auxiliary power, the outboard motor mount above must be fitted to the transom and the transom reinforced with brackets. Fig. 11 shows shape of the bowsprit.


BUMKIN-1 1/4" SRRUCE
SINGLE STAY-PORT SIDE
18"
18"
MAST
12"
1 1/4"
5"
15"
CENTER LINE
12"
DOUBLE STAYS STARB'D SIDE
OUTBOARD MOTOR MOUNTED OFF-CENTER-BOTH RIGS

ARRANGEMENT OF AFT DECK - CRUISING RIG -

To give rudder and tiller free play the mizzen mast and outboard motor, if used, are placed off center as shown above. Shape of bumkin and rigging are also given in detail.

"NOMAD"

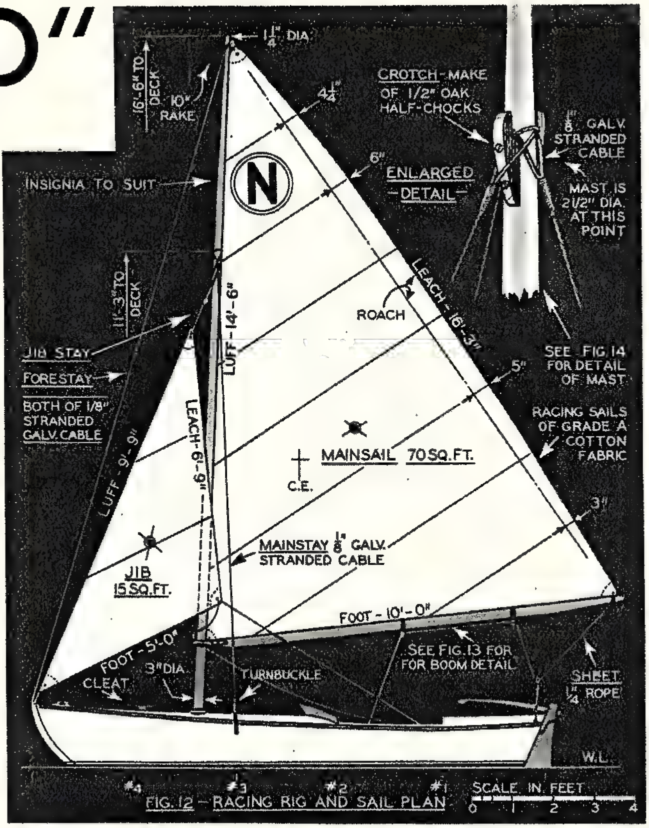

1¼" DIA.
16'-6" TO DECK
10" RAKE
4¼"
CROTCH-MAKE OF 1/2" OAK HALF-CHOCKS
⅛" GALV. STRANDED CABLE
6"
ENLARGED DETAIL
MAST IS 2 1/2" DIA. AT THIS POINT
INSIGNIA TO SUIT
N
11'-3" TO DECK
LUFF-14'-6"
LEACH-16'-3"
ROACH
JIB STAY
FORESTAY
BOTH OF 1/8" STRANDED GALV. CABLE
5"
SEE FIG. 14 FOR DETAIL OF MAST
RACING SAILS OF GRADE A COTTON FABRIC
LEACH-6'-9"
LUFF-9'-9"
MAINSAIL 70 SQ. FT.
C.E.
3"
MAINSTAY ⅛" GALV. STRANDED CABLE
JIB 15 SQ. FT.
FOOT-10'-0"
FOOT-5'-0"
3" DIA.
CLEAT
TURNBUCKLE
SEE FIG. 13 FOR FOR BOOM DETAIL
SHEET ¼" ROPE
W.L.
#4
#3
#2
#1
SCALE IN FEET
0 1 2 3 4

FIG. 12—RACING RIG AND SAIL PLAN

Here is Nomad rigged as a racing sloop. Mast and boom are hollow to reduce weight. Note breakwater ahead of cockpit to turn down waves washing over.

With the deck frames in place the decking can be laid. This can be either ⅜" tongue and grooved white cedar, spruce, or cypress or it can be a double layer of ⅛" by 3" spruce laid diagonally and fastened as shown in Fig. 19.

It is advisable to build the double diagonal deck on a separate temporary form and fasten it to the boat in one piece trimming the edges and the cockpit after it is fastened. The whole deck is covered with six-ounce canvas laid in marine glue after it is completed. Where coamings are fitted especially in the way of the cruising cabin enough canvas should be allowed around the edges to make a turn up of about ¾" for watertightness. Be sure that before the deck is fitted that little wedges are fitted between the planks and bulkhead frames to secure watertightness at these points. Note also how spruce blocks are fitted between the beams wherever a fitting is placed on the deck or where mast tubes go through the deck. (Fig. 15).

The deck edges are supported by ½" diameter steel tubes of the seamless and thin wall variety as shown in Sections CC & BB, Fig. 15. They may be purchased from any airplane supply house. The wall thickness should be as thin as it is possible to obtain and the ends should be heated to a cherry red before flattening. The tubes should be

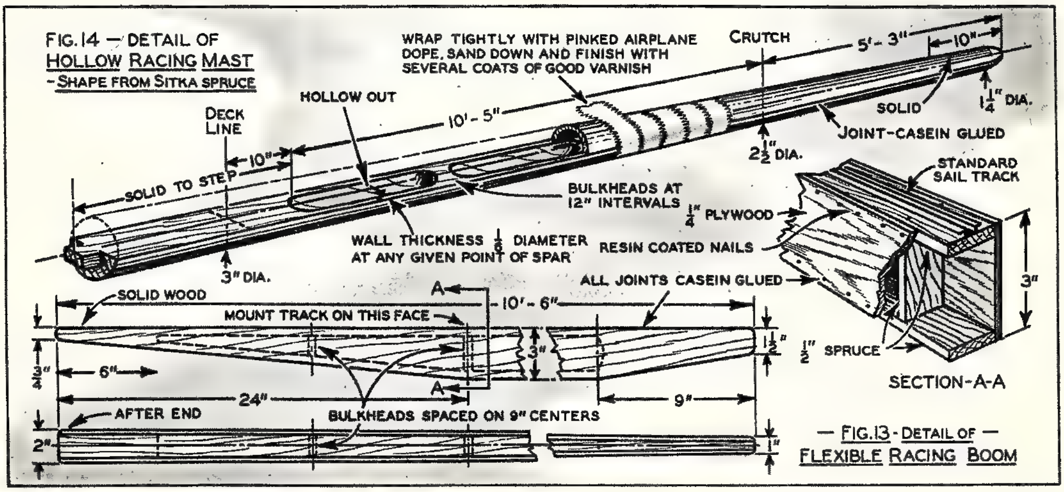
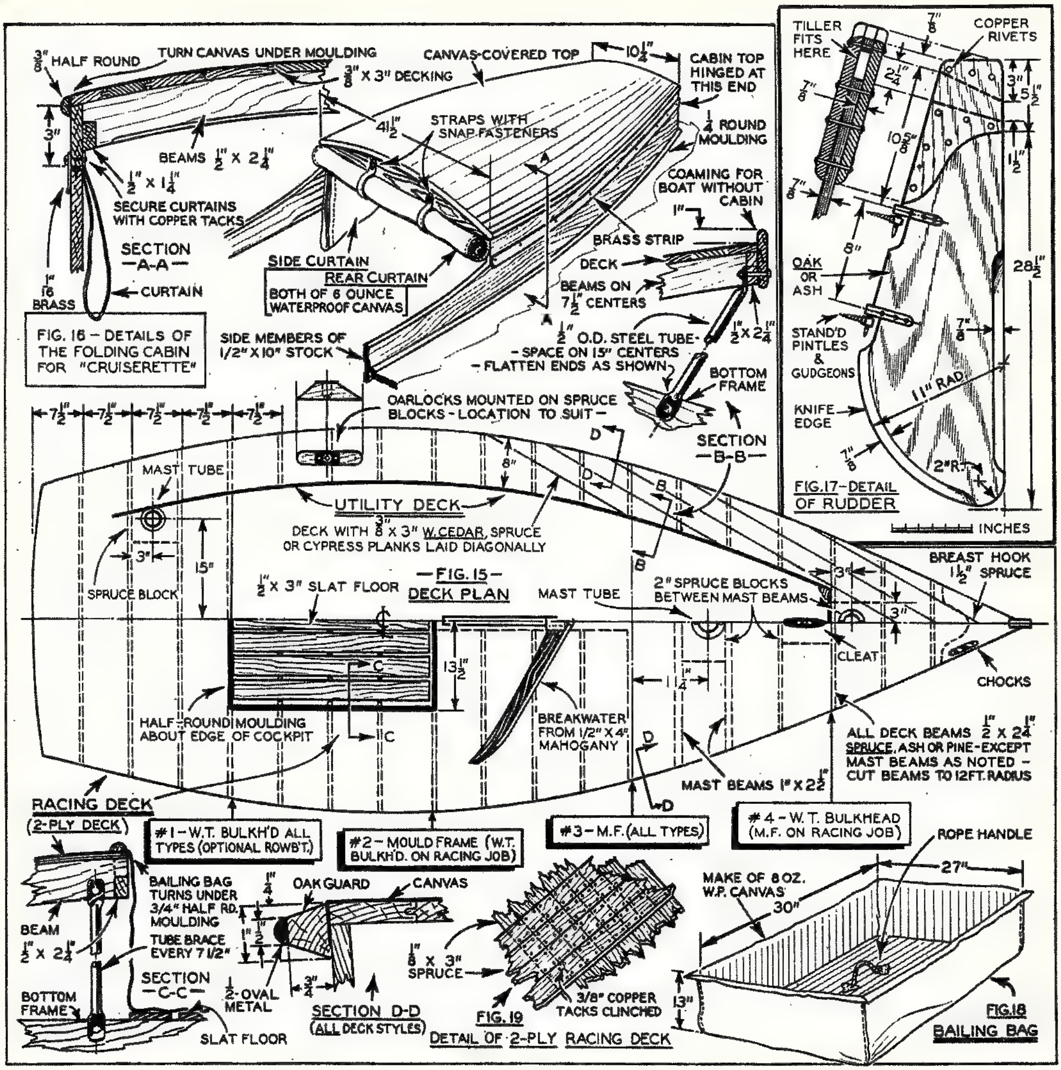


FIG. 14—DETAIL OF HOLLOW RACING MAST
-SHAPE FROM SITKA SPRUCE
WRAP TIGHTLY WITH PINKED AIRPLANE DOPE, SAND DOWN AND FINISH WITH SEVERAL COATS OF GOOD VARNISH
CRUTCH
5'-3"
10"
HOLLOW OUT
SOLID
1¼" DIA.
DECK LINE
10'-5"
JOINT-CASEIN GLUED
10"
2½" DIA.
SOLID TO STEP
STANDARD SAIL TRACK
BULKHEADS AT 12" INTERVALS
¼" PLYWOOD
WALL THICKNESS ⅛ DIAMETER AT ANY GIVEN POINT OF SPAR
RESIN COATED NAILS
3" DIA.
ALL JOINTS CASEIN GLUED
SOLID WOOD
A
10'-6"
MOUNT TRACK ON THIS FACE
1½"
3"
¾"
6"
½" SPRUCE
3"
A
24"
9"
SECTION-A-A
AFTER END
BULKHEADS SPACED ON 9" CENTERS
2"
1"
—FIG. 13-DETAIL OF—
FLEXIBLE RACING BOOM

The racing spars are built as shown above. The mast is stepped in the usual manner. In hollowing out the mast carefully follow directions in the text. Note that bulkheads are spaced on 9" centers in the flexible racing boom above.

Nomad's Bailing Bag Is New Feature; Here Are Decking and Cabin Details


3/8" HALF ROUND
TURN CANVAS UNDER MOULDING
CANVAS-COVERED TOP
10 1/4"
CABIN TOP HINGED AT THIS END
3/8" X 3" DECKING
3"
BEAMS 1/2" X 2 1/4"
1/2" X 1 1/4"
SECURE CURTAINS WITH COPPER TACKS
SECTION -A-A-
1/16" BRASS
CURTAIN
FIG. 16 - DETAILS OF THE FOLDING CABIN FOR "CRUISERETTE"
4 1/2"
STRAPS WITH SNAP FASTENERS
1/4 ROUND MOULDING
COAMING FOR BOAT WITHOUT CABIN
1"
BRASS STRIP
DECK
BEAMS ON 7 1/2" CENTERS
SIDE CURTAIN
REAR CURTAIN
BOTH OF 6 OUNCE WATERPROOF CANVAS
SIDE MEMBERS OF 1/2" X 10" STOCK
1/2" O.D. STEEL TUBE - SPACE ON 15" CENTERS - FLATTEN ENDS AS SHOWN
1/2" X 2 1/4"
BOTTOM FRAME
SECTION -B-B-
OARLOCKS MOUNTED ON SPRUCE BLOCKS - LOCATION TO SUIT -
7 1/2"
7 1/2"
7 1/2"
7 1/2"
7 1/2"
MAST TUBE
8"
UTILITY DECK
DECK WITH 3/8" X 3" W. CEDAR, SPRUCE OR CYPRESS PLANKS LAID DIAGONALLY
3"
15"
SPRUCE BLOCK
1/2" X 3" SLAT FLOOR
-FIG. 15- DECK PLAN
MAST TUBE
2" SPRUCE BLOCKS BETWEEN MAST BEAMS
BREAST HOOK 1 1/2" SPRUCE
3"
3"
CLEAT
CHOCKS
13 1/2"
C
C
1 1/4"
HALF-ROUND MOULDING ABOUT EDGE OF COCKPIT
BREAKWATER FROM 1/2" X 4" MAHOGANY
D
D
B
B
ALL DECK BEAMS 1/2" X 2 1/4" SPRUCE, ASH OR PINE - EXCEPT MAST BEAMS AS NOTED - CUT BEAMS TO 12FT. RADIUS
MAST BEAMS 1" X 2 1/2"
RACING DECK (2-PLY DECK)
#1 - W.T. BULKH'D ALL TYPES (OPTIONAL ROWB'T.)
#2 - MOULD FRAME (W.T. BULKH'D. ON RACING JOB)
#3 - M.F. (ALL TYPES)
#4 - W.T. BULKHEAD (M.F. ON RACING JOB)
TILLER FITS HERE
7/8"
COPPER RIVETS
2 1/4"
3"
5 1/2"
10 5/8"
1 1/2"
7/8"
7/8"
8"
OAK OR ASH
28 1/2"
STAND'D PINTLES & GUDGEONS
7/8"
KNIFE EDGE
11" RAD.
7/8"
2" R.
FIG. 17 - DETAIL OF RUDDER
INCHES
BAILING BAG TURNS UNDER 3/4" HALF RD. MOULDING
TUBE BRACE EVERY 7 1/2"
BEAM 1/2" x 2 1/4"
SECTION -C-C-
BOTTOM FRAME
SLAT FLOOR
1/4"
1/2"
1"
OAK GUARD
CANVAS
1/2-OVAL METAL
3/4"
1/8" X 3" SPRUCE
SECTION D-D (ALL DECK STYLES)
FIG. 19 DETAIL OF 2-PLY RACING DECK
3/8" COPPER TACKS CLINCHED
MAKE OF 8 OZ. W.P. CANVAS
30"
27"
13"
ROPE HANDLE
FIG. 18 BAILING BAG

Carefully study these drawings as all details of decking, deck frames, coaming, cabin and flooring are covered thoroughly. The upper half of the deck plan (Fig. 15) is for the cruiser, while the lower half gives details of the racing sloop.

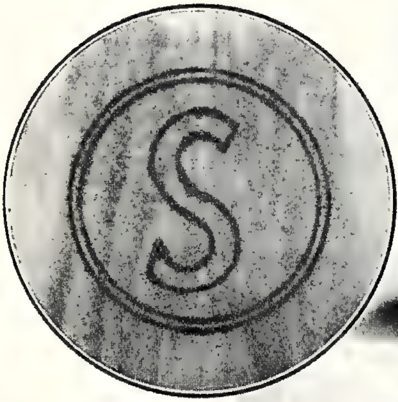
plated after flattening to prevent corrosion. Copper, nickel, chromium or stainless steel will be excellent.

The flooring is constructed of ½" by 3" spruce slats spaced about a half-inch apart. It should be made in sections readily removable to get to the bottom of the boat. The under side of the flooring in the cruiser should be placed on the tops of the main frames so as to keep the crew out of the bilge water when they sleep. The flooring sections should not be of a length greater than the main frame spacing and it should be supported at each intermediate frame.

The coamings are made of ½" material. Almost any kind of stock is suitable, but mahogany should be used if a real snappy job is wanted. In the straight row boat the coaming should not be over one inch high (Section BB, Fig. 15). In the cruiser it is made from a board ten inches wide. The top is allowed to remain straight from station 2 to station 4 and the after end carried down in a graceful taper. The racing boat carries no coaming, but a breakwater of ½" mahogany four inches wide is fitted ahead of the cockpit as shown in the lower half of

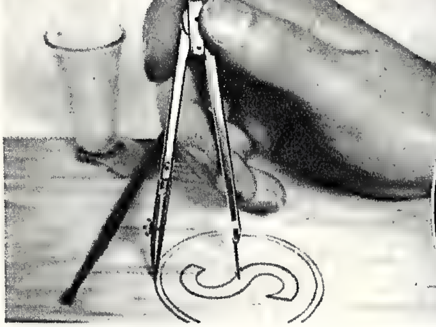
[*Continued on page* 120]

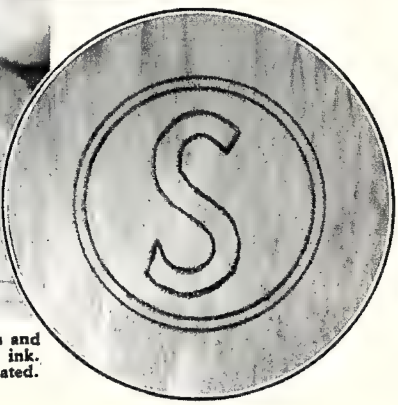
DECORATING WOOD WITH SEALING WAX



Below—The first step is pulverizing sealing wax sticks in mortar and passing powder through a sieve to separate the fine from the coarse grains.

Above—Appearance of the wet inked lines after powdering and before excess powder has been blown off. Coarser grains of sealing wax can be sprinkled over a freshly lacquered surface. When dry, heat the wax slightly and an unusually attractive finish will result.





Above—A ruling pen may be used for making lines and circles on the wood surface with the special gum ink. Right—Completed design after the wax lines are heated.

COLORED sealing wax is a novel material with which to decorate wood projects, such as cigarette boxes and other small novelties. By using the following method the wax will stand out in relief.

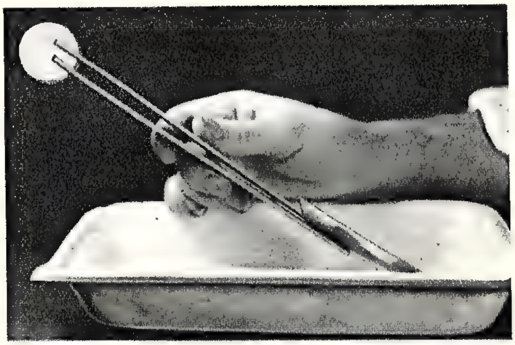
First, shellac or varnish the surface of the object to be decorated. After selecting the colors of wax you wish to use, grind up each stick separately in a mortar. Sift through a sieve into fine, medium and coarse grain powder. The fine is used for minute lines while the coarse is employed for high relief.

Outline the design on the wood surface with ink, made by dissolving gum arabic in water stained with common water color. Before the ink begins to dry, sprinkle with ground wax powder, blowing off the surplus. The powder will be retained only on the inked lines. However, each color must be inked and powdered separately.

The sealing wax is "fixed" by holding an inverted electric hot plate over the design. Remove the heat when wax begins to melt. The fuzzy, powdered lines will become glossy and stand out from the wood.

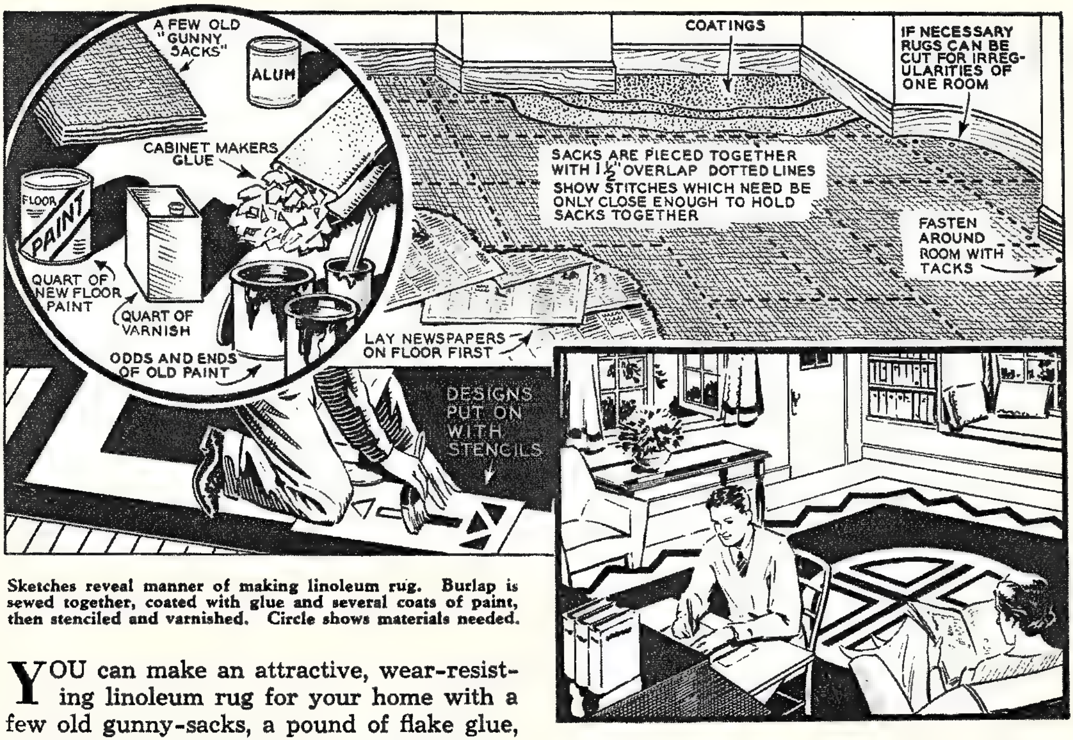
Wooden Tongs Aid Darkroom Work

HANDY tongs for holding photo prints as they pass through the solutions can easily be made by gluing two ⅛-in. strips of wood in spaced grooves in a 1-in. disc. The wooden nippers are sufficiently elastic so that slight pressure of the fingers will grasp the print firmly without harming the emulsion.



The danger of staining photo prints while passing through chemicals is eliminated with this set of wooden tongs.

Linoleum Rug, Made from Odds and Ends, Costs Only $2


A FEW OLD "GUNNY SACKS"
ALUM
CABINET MAKERS GLUE
FLOOR PAINT
QUART OF NEW FLOOR PAINT
QUART OF VARNISH
ODDS AND ENDS OF OLD PAINT
COATINGS
IF NECESSARY RUGS CAN BE CUT FOR IRREGULARITIES OF ONE ROOM
SACKS ARE PIECED TOGETHER WITH 1½" OVERLAP DOTTED LINES SHOW STITCHES WHICH NEED BE ONLY CLOSE ENOUGH TO HOLD SACKS TOGETHER
FASTEN AROUND ROOM WITH TACKS
LAY NEWSPAPERS ON FLOOR FIRST
DESIGNS PUT ON WITH STENCILS

Sketches reveal manner of making linoleum rug. Burlap is sewed together, coated with glue and several coats of paint, then stenciled and varnished. Circle shows materials needed.

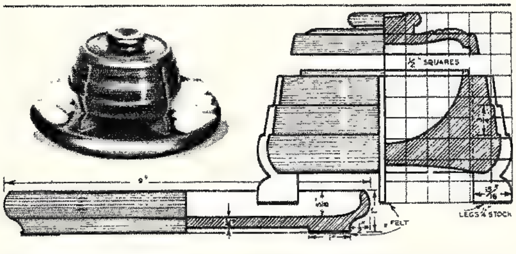
YOU can make an attractive, wear-resisting linoleum rug for your home with a few old gunny-sacks, a pound of flake glue, a dime's worth of alum, some colored paint and a quart of varnish. Best of all, the actual cost of materials will not exceed two dollars.

The rug can be assembled in the same room in which it will be used. First, spread the floor surface with old newspapers. Then cover the area with single thicknesses of burlap, overlapping the pieces an inch or two and seaming lightly with darning needle and twine. The burlap may be cut to fit irregularities in the room. Edges are tacked after all wrinkles in the cloth are smoothed. Add boiling water to melt a pound of cabinet makers' glue which has been soaked overnight. Dissolve two ounces of chrome alum in a little hot water and stir into the creamy glue. This should give you about a gallon.

Apply the first coat hot and thin. When dry, give a second coat to fill up the pores. Next, apply three coats of any old paint to the base, allowing each to dry thoroughly. Select a desirable background color and cover the rug with a good grade floor paint. Borders and scroll work or the central design may be stencilled in a single evening. The nature of the design will depend on your ingenuity.

When the trimming has dried, varnish the entire surface. You will have an inexpensive linoleum rug which will provide many years of service.

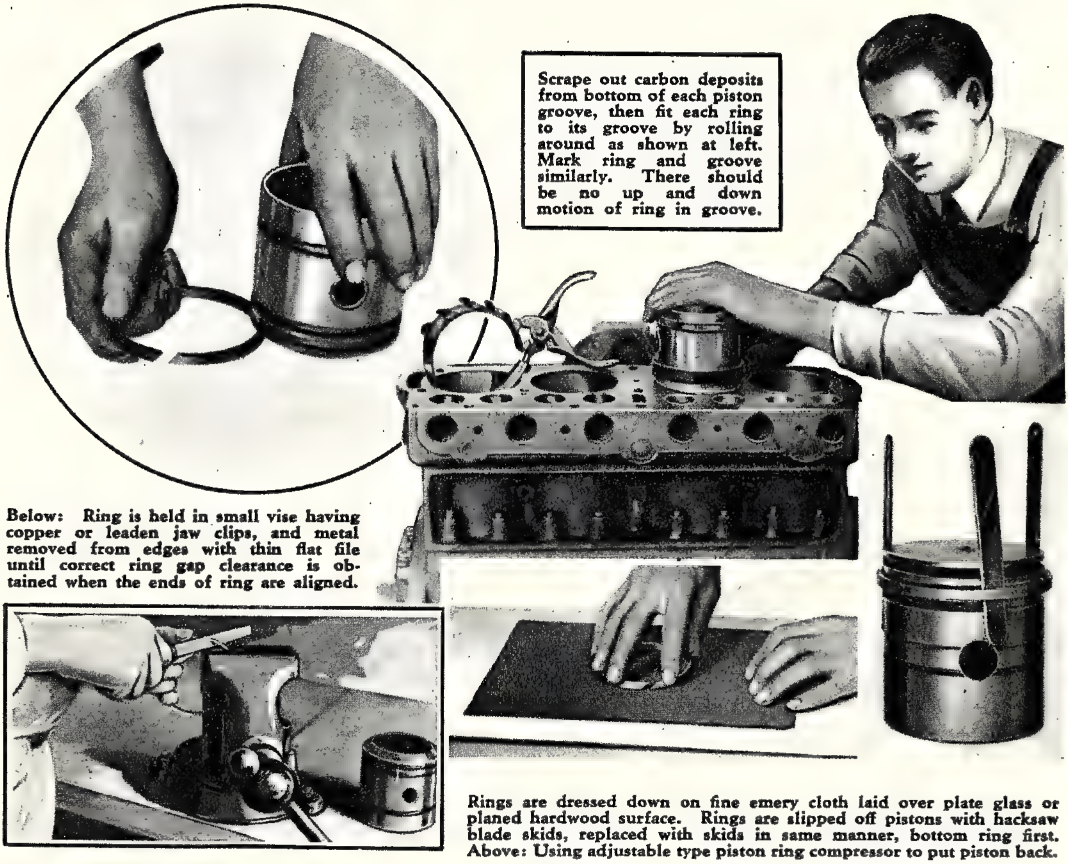
Serve Your Guests from This Combination Cheese and Cracker Tray


½" SQUARES
9"
FELT
LEGS ¼" STOCK
15/16"

Build this attractive tray following squared diagram for dimensions. Finished article is seen in photo shown above.

THIS lathe-turned cheese and cracker tray will make an attractive article for your table. The cheese nests in a glass bowl inside of the center compartment while the crackers are placed along the outside edge of the tray. The container also has many other uses. The 9-in. tray is turned first and the smaller bowl is mounted in the center, supported by four saw-edged uprights of plywood. Sand, stain and finish with French polish, varnish, wax or any other finish.

How To Install New PISTON RINGS



Scrape out carbon deposits from bottom of each piston groove, then fit each ring to its groove by rolling around as shown at left. Mark ring and groove similarly. There should be no up and down motion of ring in groove.

Below: Ring is held in small vise having copper or leaden jaw clips, and metal removed from edges with thin flat file until correct ring gap clearance is obtained when the ends of ring are aligned.

Rings are dressed down on fine emery cloth laid over plate glass or planed hardwood surface. Rings are slipped off pistons with hacksaw blade skids, replaced with skids in same manner, bottom ring first. Above: Using adjustable type piston ring compressor to put piston back.

IF THE oil consumption of your automobile is all out of proportion to the number of miles you drive, and the engine has poor compression, worn or faulty piston rings are undoubtedly the trouble-makers. In any car, rings will wear down gradually to the point where it is economical to replace them after about 25,000 miles of driving. This work is not at all hard, and can be done by anyone who it able to take an engine apart and put it together again.

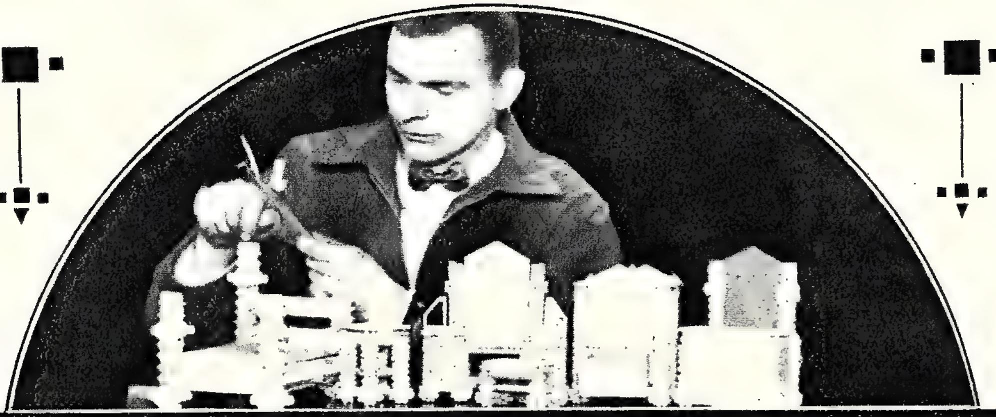
Old rings are removed with skids made by grinding the teeth off old hacksaw blades. One end of the ring is pried out of the piston groove, and three of these skids slipped under, and then pushed around to positions 120 degrees apart. The ring will now slide off easily.

Piston rings should always be ordered .005 inches larger than the rings which previously were used. If .015 oversize rings were installed at the last overhaul, order .020 oversize rings this time.

The rings must first be fitted to the grooves in order to check for proper clearance at all points. Fit each ring for a particular groove, dressing down on emery cloth laid over a surface plate or piece of plate glass until the ring will roll free all around the piston.

The next step is to fit the rings to their respective cylinders. Place each in turn in the cylinder block, and try to insert the thinest blade of a feeler gauge between the ends of the ring. If this cannot be done when the ends are aligned, dress off enough with a fine file to give a clearance between the ends of from .012 to .015 inches for the top ring, .006 to .008 inches for the middle ring, and .004 to .005 inches for the lower ring.

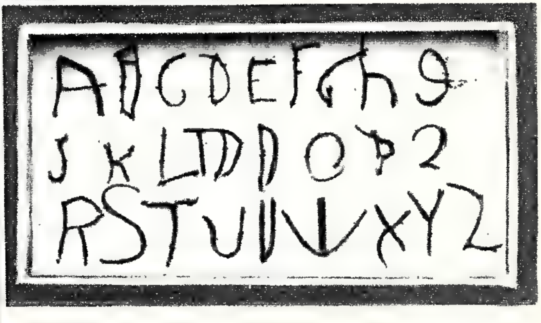
With the rings fitted to the pistons and the cylinders, you are ready to install the piston assembly. A piston ring compressor, which can be made from a piece of strap iron, is used to compress each ring in turn as the piston is pushed down into the cylinder. The strap iron is bent to fit almost around the piston, and the ends bent out to form handles.



WITH THE COLLECTORS

No glue or nails were used by Harvey Orser, of Drayton Plains, Mich., in building the above six-piece bedroom set; every one of 1,450 pieces are neatly notched together.*

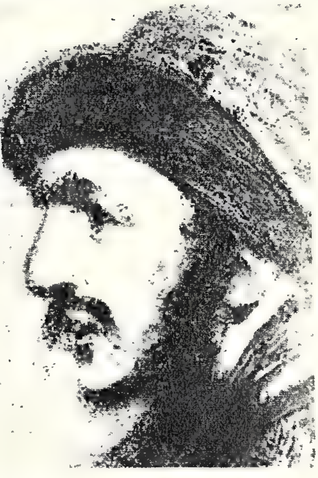
A scene at the Washington, D. C., post office, to which stamp collectors flocked on March 15 to purchase U. S. stamps without gum or perforations, issued by Postmaster Farley to make less valuable similar sheets he had previously distributed to friends. In that one day philatelists spent $529,838.95 for 20 varieties of stamps.



Gathering natural alphabets from twigs is the unusual hobby of Lear Mundy, Durham, N. H. Above collection was gathered in trips as far west as Illinois, and includes cherry, apple, poison ivy, bittersweet, as well as the more common woods. Blueberry bushes furnish the best S, white pine the X. Hardest to find is the R, with B almost as scarce.*

RAAUN RADUM ROAM
RAUM REAM ROAUM
RAUUM REAUM RUM

Collecting different ways in which people spell his name is the bizarre hobby of Raymond Raaum, of Fargo, N. Dak. For proof he has envelopes showing the errors. Above are just a few of the many versions of his name.*



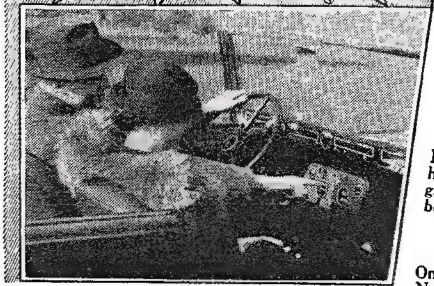
In following her hobby of collecting tiny art pieces, Mrs. Edwin Ford (circle), wife of Professor Ford, of the University of Minnesota, spent six cents in London for a faded 4"x6" painting. Now American art institutes pronounce the miniature an authentic Sir William Beechey portrait painted in 1823, worth several thousand dollars. The painting is pictured above. Many other hobbies often pay just as big profits.

Stories followed by an asterisk are winners of the three $5.00 cash prizes awarded by the Hobby Editor this month for descriptions of unusual hobbies.

New INVENTION SAVES GAS!

3 TO 7 MILES MORE PER GALLON

MOTORIST SAVES $180.00 a YEAR



CHRYSLER
Have tried the Vacu-matic and it sure is fine. Better pick-up with a 30% gas saving.—John C. Martin, Pa.

PLYMOUTH
I am amazed at Vacu-matic performance. It's giving me 5 more miles per gallon. - Walter Zielinski, Ill.

V-8 FORD
I installed both Vacu-matics and they work excellent. On my own V8 Ford I notice wonderful performance in pickup, get-away and gas saving. — Burt Burnett, Mich.

BUICK
Everything you claim about Vacu matic is true. I now get 20 miles to the gallon. Before I was only averaging 15½ miles. — C. Constantino, Fla.

FRANKLIN
With Vacu-matic I have increased my mileage from 10.1 to 14.2 miles per gallon. I figure I save over $75.00 a year in gasoline. R. K. Radtke. Wis.

SAVES $180 A YEAR
On my Plymouth 6 I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of $15 a month or $180 a year. F S. Peck, Calif.

CHEVROLET
Please send me a Vacu-matic for a Model A. The mileage on my 1933 Chevrolet jumped from 18 to 22 miles per gal. with Vacu-matic. — Paul P Haas, Mass.

ALL WELL PLEASED
Enclosed find order for 12 more. Everyone I have sold is giving from 4 to 6 more miles per gallon. I have 3 more orders for V8 Ford. Everybody is well pleased.—J. O. Carll, Texas.

MODEL A FORD
Have been using the Vacu-matic for a month. I used to get 20 to 22 miles per gal. Now I get 30 to 33 miles. It is amazing the difference it makes.—James W. Barr, Canada.

NASH
On my Advanced 6 Nash gained 17½% in mileage. The car will idle down to 3 miles an hour and then take gas without a complaint. — J. Showalter, Mo.

DODGE
Just completed 2310 miles on 92 gallons in my 1933 Dodge 6. This figures 25 miles while before I averaged only 20 miles per gal. on trips. — Al Fruzyna, Calif.

OLDSMOBILE
I am well pleased with Vacu-matic on our Oldsmobile. A test proved it to give 18 miles per gal. Before we considered 13 good. — Arthur Williams, N. Y.

Above are just a few of the many unsolicited letters received from Vacu-matic users.

Saves up to Thirty Per Cent On Gas.
Provides Faster Pick-Up---More Power---
Greater Mileage and Smoother Running.
GET FREE INFORMATION

VACU-MATIC

PATENT PENDING

the Carburetor Control that "BREATHES"

AT LAST! Automotive engineers have smashed down the barriers to perfected combustion! The new VACU-MATIC solves the secret of greater power! With almost magical action, this amazing invention instantly puts new life and pep in any motor. It adds mileage to every gallon of gasoline . . . produces split-second pick-up, sensitive accelerator response, greater speed and smoother running

New- *Automatic*- Nothing Like It!

The self-starter—four wheel brakes—knee action—streamlining . . . and now VACU-MATIC! The greatest motor improvement of recent years! With it, engineers have achieved a practical means of balancing air and gasoline automatically for all speeds. Vacu-matic is *entirely different!* It is AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. Just put it on and forget it! Sharply cuts fuel wastes, saves dollars in gas costs, reduces carbon and gives your engine new pep, greater power and longer life.

Agents and Salesmen

If you are interested in earning unusual profits, check coupon. Exclusive territories are now being granted.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and welded into one unit, correctly adjusted and *sealed at the factory*. Nothing to regulate. Any motorist can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

The VACU-MATIC Co., **Wauwatosa, Wis.**

Guaranteed Gas Savings

The VACU-MATIC proves itself on every car. It is guaranteed to give worth-while gas savings, quicker pick-up, and more power or it costs you nothing. "On a test I gained an average of 4 miles on a gallon," writes Alex Wertz. "Vacu-matic is the best I have ever tried." Clarence Rutzin—"I have tried the Vacu-matic on several tests and find that I get between 5 and 6 miles per gallon increase, have more mileage, have greater pickup."

Free Details

Learn about this remarkable device that so greatly affects the entire performance of your motor. Learn why your car is costing you extra money to operate without VACU-MATIC. See why your VACU-MATIC equipped car will leap away from traffic without sputter or hesitation. Discover a new driving thrill and enjoy the savings. Get the facts! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY
7617-100 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

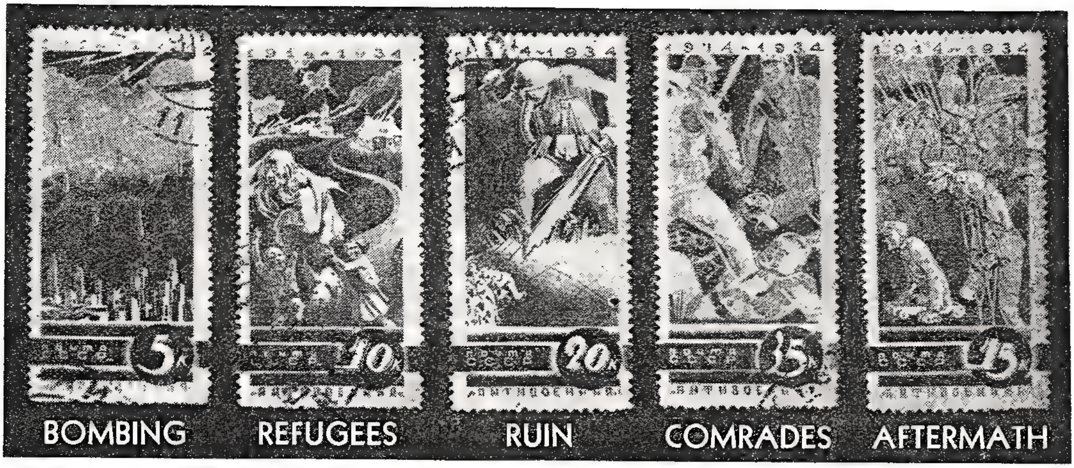
Name..

Address..

City.. State..........................

☐ Check here if interested in selling proposition.

Russian Anti-War Stamps Vividly Show Horrors of Battle



On 20th Anniversary of start of the World War, Soviet Russia issued this "Anti-War" series of five stamps. They show: 5k—Black clouds of War approaching; 10k—Horror stricken fugitives fleeing from a burning village; 15k—Transformation of soldiers into cripples and invalids; 20k—The Sword as a plow, tearing up cities; 35k—Comrades meeting under fire.

ADLETS FOR HOBBYISTS

STAMPS

YOU'VE tried the rest—now get the best! "Challenge Collection" including Cape Good Hope, triangle, only existing octagonal stamp, etc., 10c with approvals. Free Airmail Collection and additional premiums to regular customers. Comparison proves conclusively the superiority of "Bargain Stamp Service," 1332 South Hope, Los Angeles, California.

BRITISH TURKISLANDS—Also Congo's—Montecarlo—Nigercoast—Uganda—Djibouti—Ecuadorian — Ivorycoast—Ubangi—Countries collectors need. Free for 5c postage. EMPIRESTAMPSHOP, Dept. M.M., TORONTO, CANADA.

FREE, for promptness in ordering complete plans for making stamp album for twenty-five cents, tips for collecting, cleaning and real stamps used to demonstrate mounting. Havert Stamp Company, Department A, Milford, Kansas.

1897 NEWFOUNDLAND Commemorative-superb mint Cabot Commemorative cataloging 25c. Brunei, Turks Caicos Islands, $5 U. S., genuine Baden and imperforate "Park"—Everything only 5c to approval applicants! Viking Stamp Co., One Hanson Place, Brooklyn, N. Y.

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FREE. Ascension, Grenada Pictorials. Commemoratives, also other scarce islands. Provided you desire approvals. Grandstamps, 919 South Grand, Los Angeles, California.

MARYLAND, Kentucky, Texas, Commemorative $½s, $1.50 ea. White cent and selling Catalogue, 10c. Buying [illegible] cents. 10c. Norman Shultz, Salt Lake, Utah.

105 Different, Guinea, Congo, Hyderabad, etc., 3c to approval applicants. Extra—Airmail Set free with above. Hunziker, Box 225-F, Minneapolis, Minn.

STAMPS! 100 diff. 3c; 500 diff. 35c; 1,000 diff. 90c! Illustrated Album (4000 spaces) 22c. Approvals sent. Tatham Stamp Co. (D9) Springfield, Mass.

AIRMAILS—Brazil, Chile, Columbia, Ecuador, Mexico, all for 10c with double premium penny approvals. Progress Stamp Service, B98, Franklin Park, Ill.

SEND Quarter for different, generous variety of stamps and receive FREE, Beginner's Album. You'll be delighted. H-O-L-T, Electric Bldg. Omaha.

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PACKAGE of 2000 foreign mixed stamps with a package of 2000 stamp hinges by mail, $3.00. Levi Bryant, 654 East 44th St., Chicago, Ill.

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110 Different Stamps from Kouangtcheou, Inini, Latakia, etc. Only 3c to approval Buyers. M. Badger Stampco, Milwaukee, Wisconsin.

SENSATION: Airmails from 10 countries; U. S., South America; Pictorials 10c. A. Steele, Springdale, Pa.

STAMPS Sent on approval. 50% discount. Fred Herzberg, 197 Grantley Ave., Elmhurst, Illinois.

FREE!!! Russia Ethnographic Set. Postage 3c. Roberts, 901T Fourth, Baycity, Michigan.

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$2000.00 FOR 1c. We pay the World's Highest Prices for old coins, encased postage stamps and paper money, Large Cents up to $2000.00 each, Half cents $250.00, 1909 Cent $10.00, Indian head cents $50.00, half dimes $150.00, 25c before 1873 $300.00, 50c before 1879 $750.00, silver dollars before 1874 $2500.00, gold dollars $1000.00, trade dollars $250.00, 1822 $5 gold $5000.00, old paper money $26.00, encased postage stamps $12.00, certain foreign coin $150.00, etc.; send dime for large illustrated list. Romanocoinshop, Dept. 420, Springfield, Mass.

$5.00 TO $500.00 EACH paid for Old Coins. Keep all old money. Get posted. Send 10 cents for Illustrated Coin Value Book, 4x6. Guaranteed Buying and Selling Prices. Coin Exchange, Box 17, Le Roy, N. Y.

FREE: Foreign Coin, Banknote and Large Illustrated coin catalogue, for 4c postage. Approvals sent. Tatham Coinco, Springfield-9, Mass.

OLD MONEY Wanted. $5.00 to $2,500.00 each paid for old coins. Buying catalog 10c. Robert Cohen, Box 483, Muskogee, Okla.

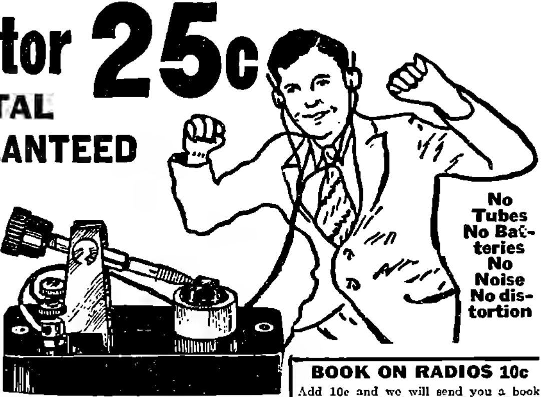
HIGHEST Prices paid for Indian Head Pennies. Send dime for list of those wanted. Coin Shoppe, Box 407-MM, Ottawa, Ill.

SAVE COINS! Foreign coin and catalogue, one dime. Carolina Coinco, Box 503, Charleston, S. C.

Crystal Radio Detector 25c

COMPLETE WITH CRYSTAL

RECEPTION POSITIVELY GUARANTEED



This Detector is a complete radio in itself, as it is possible to get reception with it alone, provided you are within 25 miles of a broadcasting station (or up to 100 miles under very favorable conditions). All you need is an aerial and an ear phone and you are all set. It is completely assembled and wired, all ready for use. It has two posts, making connection much easier, also making it possible to make changes quickly. Everything complete, including the stand, crystal cup, arm with catwhisker and necessary screws, an ultra sensitive crystal of the finest grade, two terminals for wire connections mounted on handsome base—**EVERYTHING COMPLETE FOR ONLY 25 CENTS POSTPAID.** Send coin or stamps. Every set tested and reception positively guaranteed.

BOOK ON RADIOS 10c

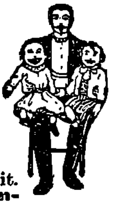
Add 10c and we will send you a book called "EFFICIENT RADIO SETS." Tells how to make inexpensive readio receiving sets, crystal as well as electrical, how to make short wave set, etc. Fully illustrated. **Price 10c Postpaid.**

JOHNSON SMITH & CO., Dept. 651, RACINE, WIS.

BOYS! THROW YOUR VOICE

LET ME OUT!
LET ME OUT!
LET ME OUT!
LET ME OUT!
LET ME OUT!

Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.



THE VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls etc. Anyone can use it. **Never fails. A 64-page Book on Ventriloquism and the Ventrilo. ALL FOR 10c POSTPAID.**

THE ART OF DANCING

Learn the Carlo, Continental, Rhumba, Kiss Dance, Etc.

25
CENTS
Postpaid

LEARN TO DANCE THE LATEST STEPS. Be popular this season. Really good dancers are always admired—always popular guests. Partners welcome them eagerly. With the aid of this book you can learn the newest, smartest steps without a teacher and become a dancer who is sought after. After following the instructions in this new book you won't need to make excuses when the dance music starts. Besides you'll get lots more fun out of parties and dances. If you want to become a perfect dancer, learn to dance at home this new, easy way.

WHAT THE BOOK TELLS: How to develop poise and control, how to improve your dance steps, the art of holding, how to walk to music, how to lead, how to do the latest Fox Trot Steps, Natural and Reverse Turns, the Reverse Wave and Change of Direction Steps, the Quickstep, swaying to music, how to waltz, Backward Changes, how to do the Continental, the famous Kiss dance, the Manhattan Dance, the College Rhumba, the Carlo, the Veyo, etc., etc. Nearly 100 illustrations are given, and everything is made so plain that you'll be dancing before you know it. **PRICE 25c POSTPAID.**

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CATALOG
JOHNSON SMITH
& CO.
RACINE WIS.

JOHNSON SMITH & CO.

Dept. 651 RACINE, WIS.

A copy of our NEW CATALOG mailed on receipt of 10c., or the De Luxe Edition with cloth binding 25c. Bigger and better than ever. Only book of its kind in existence. Nearly 600 pages of the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unprocurable elsewhere. Remit by Coin, Money Order, Check or unused U. S. Postage Stamps, for all articles listed above. Canadian money, stamps, Postal Notes and British P. O. Orders accepted.

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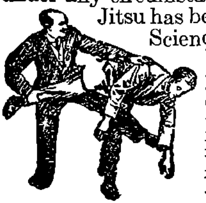
The Art of Self Defence



FEAR NO MAN. Learn to protect yourself under any circumstances without weapons. Jiu Jitsu has been proved to be the BEST Science of defence ever invented. With the aid of this book you can learn in the privacy of your own home. Complete course of lessons in fully illustrated book. PRICE ONLY 25c POSTPAID.

JAPANESE ROSE BUSHES

The WONDER of the WORLD

Will Bloom Six Weeks After Planting

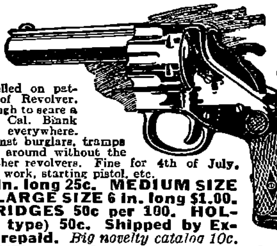
Perpetual Rose Bushes bloom all the year around. Just think of it. Six weeks after planting the seed the plants will be in bloom. It may not seem possible, but we **positively guarantee it to be so.** They will **bloom every ten weeks,** Winter or Summer, and when three years old the bush will be a mass of roses, bearing from five hundred to a thousand roses on each bush. The flowers are in three shades—white, pink and crimson. The plants will do well both in and out of doors. Send for a packet and have roses all the year round. We guarantee at least three bushes to grow from each packet of seed. PRICE ONLY 10 CENTS **Packet, three packets for 25 CENTS POSTPAID.**

Boy Electrician with 75 illustrations for making Batteries, Dynamos, Motors, Telegraph apparatus, Telephone, Lights, Bells, Alarms, Coils, "Wireless" Current Reverser, Electric Engine, Radio, etc. **Price 10c Postpaid.**

BLANK CARTRIDGE PISTOL

REVOLVER STYLE

25c
50c
$1.00



Three new models now out, **25c, 50c and $1.00.** Well made and effective. Modelled on pattern of latest type of Revolver. Appearance alone enough to scare a burglar. Takes 22 Cal. Blank Cartridges obtainable everywhere. Great protection against burglars, tramps dogs. Have it lying around without the danger attached to other revolvers. Fine for 4th of July, New Year's, for stage work, starting pistol, etc. **SMALL SIZE 4 in. long 25c. MEDIUM SIZE 5 in. long 50c. LARGE SIZE 6 in. long $1.00. BLANK CARTRIDGES 50c per 100. HOLSTER (Cowboy type) 50c. Shipped by Express only not prepaid.** *Big novelty catalog 10c.*

JOHNSON SMITH & CO., Dept. 651, Racine, Wis.

Be A Better Shot!

Here's How!

Of course you want to improve your shooting! This NEW free booklet will help you! Should be in the hands of every small bore rifleman. Interesting! Instructive! Gives actual experiences with Super-X Long Range .22's on game. Tells all about Super-Match, the new Western Smokeless .22 L. R. target cartridge. Mail coupon *now!*

Coupon Brings FREE New Booklet On Rifle Shooting

Western Cartridge Company,
Dept. G-105, East Alton, Illinois.
Mail me a copy of your NEW booklet on small bore rifle shooting, FREE. Also leaflets describing the advantages of Western small bore ammunition.
Name..
Street..
Post Office.......................State..............

REPEATING SLINGSHOT

AMAZING NEW repeating slingshot. Shoots 150 B.B. shot. Loads from handle. Just the thing for hunters and trappers, young and old. Shoots through ordinary 100 page magazine. More powerful than an air rifle. Send 25c in coin or money order (No Stamps) for one of these REPEATERS.

THE SLINGO CORP.
Dept. MM-5 **Toledo, Ohio**

ESKANOE KAYAK **READY TO ASSEMBLE $15**

Complete kits including **FREE PADDLE,** with simple plan for self-assembling. No experience needed, safest boat for children.

Also cedar and folding KAYAKS, carry 1 to 4 persons. 10 to 20 ft. For paddling, sailing, hunting & fishing, non-sinkable, light, portable. Expert Kayak designer and builder since 1924

Send 10c Postage for catalog illustrating 16 models & new self-assembling plan.

KAYAK BOAT CO., 147 East 84th Street, N. Y. C.

Sell 7 Big Bars

OF FINEST TOILET SOAPS for only 25¢

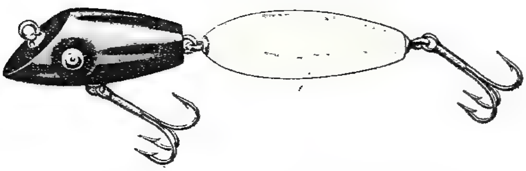
Seven cakes of finest toilet soaps in handsome package sells for only 25c. The kind of soap used in every home every day. Selling value marked on box $1.00. You sell for only 25c. Housewives buy on sight. Up to 100% profit for you. Write for money-making details and facts about other sensational Victor Soap deals. For quick action send 25c for actual full sized sample.

a chance to earn up to $65 a week

VICTOR SOAP CO. **Dept. MM-75** **Dayton, O.**

Choosing "Sure Shot" Casting Lures

[*Continued from page* 70]



Here is another good plug for the tackle box. Known as the Wig-Wag it performs all sorts of tricks to attract fish. A jointed plug, it swims a little below the surface. It comes in bass and muskellunge size and in three different finishes.

the most effective of any that you can possibly offer the bass. Lures that are plunked or popped on the surface can be used effectively when the water is roiled and the fish cannot see the lure, but can be led to it by the sound.

A sub-species of the wobbling plug that must, however, be considered in this class, is the so-called hinged, "broken," or jointed plug. Plugs in this variety are to be had in two and three sections. When reeled through the water, these jointed minnows have a weaving side to side motion that is extremely lifelike, so much so that it well becomes one of the most deadly of plug performers. When at rest these jointed plugs invariably float on the surface, and may, by twitches of the rod tip, be made to wag the tail.

Jointed lures not only have proved their effectiveness in bass fishing, but in muskellunge fishing as well.

There are certain bass plugs that operate almost strictly on the surface. That is to say, they do not dip and dive and go under water when reeled as the wobbler plugs do.

Handling Floating Plugs

In the class of strictly top-water lures the so-called "wounded," "injured" or "crippled" minnow must be given very careful consideration as a lure that is packed with dynamite. To aid it in boiling up the water this type of plug or "minnow" is provided with a propeller spinner fore and aft. These revolve nicely, stirring up the water to simulate the antics of a disabled minnow. To carry out this deception further, the lure actually lies on its side. Cast it up in a pocket or indentation in the lily pads and let it lie there a minute or so, just stirring it to life by twitches of the rod-tip. Looks interesting, doesn't it? Give it a jerk after a moment, which will stir up the water. Now reel it a foot or two and again allow it to rest silently on the water. If a bass is around, look out, for he is likely to hit and hit it hard.

Another type of strictly surface plug that boils up the water, thus imitating the actions of a drowning creature of either aquatic or earth origin, is the so-called revolving head

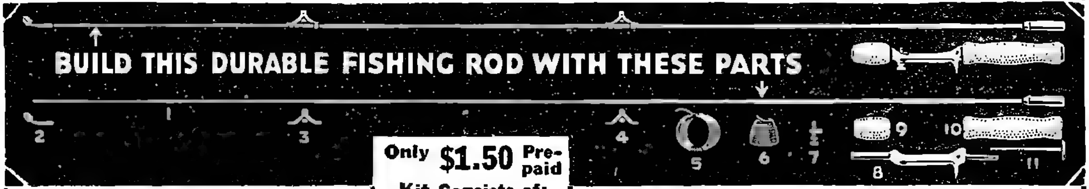
[*Continued on page* 123]

When I CACKLE, it means a fresh egg.
EVEREADY FLASHLIGHT BATTERIES are so FRESH, we'd like to cackle too!
Nº 950
EVEREADY
TRADE MARK
EXTRA LONG LIFE BATTERY
NATIONAL CARBON CO. INC.
FOR BEST RESULTS PUT IN SERVICE BEFORE NOV. 1935

LOOK FOR THE "DATE-LINE"

Batteries are apt to "go dead" on dealers' shelves. Only FRESH batteries give long, dependable service. The "Date-Line" on all Eveready Batteries guarantees they're absolutely *fresh* . . . National Carbon Company, Inc., New York, N. Y.

LOOK! AMAZING FISHING ROD OFFER!
Mail Coupon at Once for Parts-Kit! Supply Limited!



BUILD THIS DURABLE FISHING ROD WITH THESE PARTS
1
2
3
4
5
6
7
8
9
10
11

ACCEPT THIS AMAZING OFFER! Make popular style one-piece solid steel fishing rod for only $1.50. Kit contains everything you need. Easy to do with instruction furnished. Take advantage of this introductory offer. Satisfaction guaranteed. Mail coupon at once!

Only $1.50 Pre-paid

Kit Consists of:

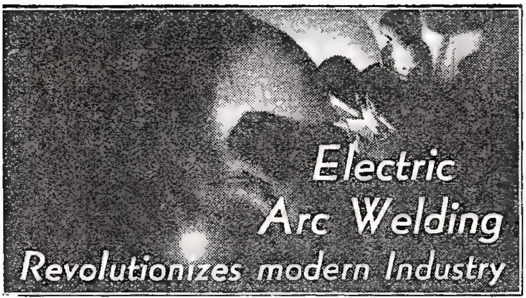
1. Solid Steel Rod
2. Top Tip
3. Guide
4. Guide
5. Winding Wire
6. Solder
7. Reel Lock
8. Drop Handle
9. Forward Grip
10. Hand Grip
11. Butt Plate

MAIL THIS COUPON NOW! AVOID DELAY!
GEPHART CO. (Steel Rod Specialists), 220 W. Illinois St., Chicago, Ill.
Enclosed find Money Order for $1.50 ($1.75 West or Denver) for Gep-Kit, as shown. ☐ 4 1-2 ft. ☐ 5 ft. ☐ 5 1-2 ft. Check length wanted.

Name ______________________________

Address ______________________________

Dealer's Name ______________________________



Milwaukee Manufacturers desire to contact earnest men to work and learn **Electric Arc Welding** in their laboratories at the School of Engineering. Small training Fee. Accepted applicants will be fully trained until ready to pass rigid test and assisted in securing employment.

Arc Welding presents one of the outstanding opportunities for steady income and future success. Welding is growing rapidly, replacing large and intricate castings, rivets, nuts, bolts, screws. It is commonly used in assembling cranes, hoists, bridges, structural steel work, etc. No limit to the application of welding to industry, increasing durability and reducing manufacturing cost. There is a decided shortage of properly trained welders. Why be content with ordinary work, hit or miss jobs and low pay when in a short time you can become a trained Specialist in Welding?

MILWAUKEE
SCHOOL of ENGINEERING
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MM 735-B—Broadway and E. State, Milwaukee, Wis.

Without obligation send Free Booklet "The Dawn of a Gigantic Industry and its Outstanding Opportunities."

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BUILD—

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AUTO TRAILERS, FURNITURE, BOATS, RADIOS, MODELS

The New 1935

HOW TO BUILD IT

Tells You How

149 Different Complete Shop Plans For Only 50c

If your dealer is sold out send 50c to

MODERN MECHANIX PUBLISHING CO.
529 S. Seventh St., Minneapolis, Minn.

Completing "Nomad"

[*Continued from page* 110]

Fig. 15. This breakwater is slanted forward to turn down any wave that may run along the deck. The breakwater is fastened to the deck by No. 8 screws toed into the beams.

The forward edge of the stem and the edges of the guards (Section DD, Fig. 15.) should be protected with half oval strips one-half inch wide. These may be of brass or galvanized iron.

Fittings for Folding Cabin

The sides of the folding cabin for the cruiserette are made to fit the curve of the coaming and the beams are the same as for the deck. As the cabin top must be walked on to get forward, the covering must be of the same thickness as the deck and in fact is a counterpart of it. (See Fig. 16). Along the forward end it is hinged to the coaming and the sides are made watertight by a strip of brass covering the longitudinal joint.

Triangular curtains are made to fit inside the cabin of such dimensions that sitting headroom will be provided at the after end when the cabin top is raised.

Bailing Bag Is Novel Feature

One of the innovations of *Nomad's* racing design is the bailing bag in the cockpit. It is made of canvas as shown in Fig. 18 and fastened under the ¾" half round moulding of the cockpit as shown in the Section CC detail drawing of Fig. 15. If the waves wash over the deck during a race, all that is necessary is to reach down and pull the whole bailing bag out of the cockpit and spill all the accumulated water out. Should the boat capsize, the watertight bulkheads will keep her afloat while the crew haul down the sails. Then pull her up on her feet, and pull up the bailing bag to empty her.

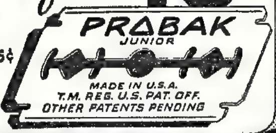
The rudder (Fig. 17) is constructed from ⅞" oak or ash with a heading of the same material, all joined together with copper rivets. The pintles and gudgeons are of galvanized iron.

The racing mast (Fig. 14) is made hollow to reduce weight aloft. It should be made from Sitka spruce which can be purchased from airplane supply houses. The mast is made in two pieces and each half hollowed separately. The wall thickness should be no less than one-sixth the diameter of the mast at any given point. Bulkheads should be left in the spar at one foot intervals and the portion below the deck and a point ten inches above it should be left solid. Where the spar becomes less than one and a half inches in diameter it should be left solid.

The spar halves are glued together with casein or cold water glue, allowed to set, and

[*Continued on page* 128]

PROBAK
JUNIOR
4 BLADES *for* 10¢
ALSO
10 FOR 25¢
25 FOR 59¢



HERE'S THE TOP
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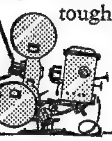

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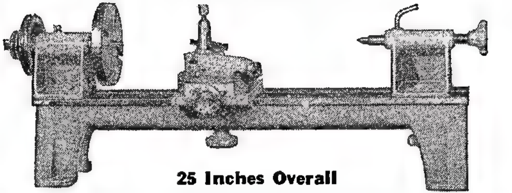

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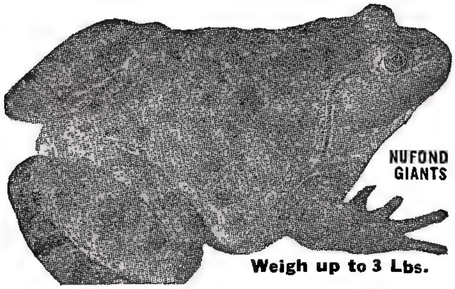

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EXCELSIOR

How Three Color Movies Are Made

[Continued from page 77]

three negatives are made, one each for the three colors, red, green, and blue. All colors of the rainbow can be reproduced by a blending of these three primary colors. The three negatives are made through filters which absorb certain portions of the light passing through them. The light striking the red negative is photographed through a red filter that absorbs or stops all the colors except red. This gives a photographic record of the red objects in the picture. In like manner, the green and blue negatives are photographed through green and blue filters.

Color Camera Takes Three Negatives

Walt Disney and his staff paint the cartoons in the colors desired, and then a special Technicolor camera photographs the three negatives at one operation. The three negatives are made simultaneously through the use of a special prism. Each of these negatives records the intensity and extent of only one color; for instance, on the blue negative is a picture of only the blue color in the objects, on the red negative is the image of the red objects, etc. From each of the three negatives is made a print on a special gelatine coated stock, which is called a "matrix." In making the "matrix," a silver image is not used as in the case of ordinary black and white photography. Instead, a photographic emulsion in the form of a gelatine, sensitive to light, is used.

This gelatine emulsion has the characteristic of hardening under the action of light. When light strikes this emulsion after going through the negative, it becomes hard and insoluble in proportion to the intensity of the light striking it.

Technicolor "Prints" With Dyes

In making the red "matrix," a light beam is passed through the negative of the red record by an optical arrangement to strike the "matrix." This is called "optically" printing the "matrix;" after it is printed the soluble portions, that is, the portions not acted on by light, are dissolved away, leaving a relief image. This relief image is then dyed a blue-green color and pressed into contact with the film which is to be shown on the screen. In pressing this "matrix" into contact, the dye image is printed in a manner not unlike the method used in printing from type in the printing press. The matrices for the other two colors are made and dyed in the same manner, after which they are also pressed into contact on top of the first image. This results in a picture which is a combination of the three colors, and is the final film ready to be shown on the theater screen. Once the matrices are prepared, as many three-color films as are desired can be printed.

Choosing "Sure Shot" Casting Lures

[*Continued from page* 118]

lure. The head revolves on a shaft, creating a gurgling, churning sound in the water. In the half-dusk of evening the revolving head lure proves unusually effective.

Both the floating injured minnow type and the above are excellent for use in the evening and at night. The bass are led to them by the sound they make in stirring up the water. The propeller spinner lures and the ones that are popped on the surface are among the most deadly of plug lures.

Using the Underwater Plugs

Among the lures that go deep to interest the fish are certain deep-roving plugs, plugs that sink of their own weight, and which, when down to the required depth, can be retrieved with short jerks of the rod-tip. They have a very attractive motion and are exceedingly effective in river fishing.

One of the original artificial minnows was the typical long bodied plug, with lead countersunk on its breast or belly which caused it to sink down as deep as one desired when it was reeled. These underwater lures are provided with three to five gangs of hooks. One can troll with these, allowing 75 feet of line to be out. Wall-eyed pike are often found in weed-free water, hence these lures are probably as good as any for this species.

The use of double hooks on lures is interesting in that the hooks turn up, instead of down. As a result the body of the lure acts to some extent as a weed guard.

How to Select Color for Lures

Without doubt the plug lure coloration that is the most uniformly successful is the white body with the red head. Given this light coloration, one can fish it on grey days, as well as in the dusk, and in water, too, that may be dingy. In clear water, the opposite is the case. Here a chub or frog coloration, or, again, the famous pikie (barred) coloration should be used. In picking one's lures, therefore, it is well to have at least one in white with red head, and at least two others in differing colors. Probably it is true that so far as the fish is concerned, it is the action, and not the color that counts.

It is often confusing for the beginner in bait casting to pick the proper coloration of lure. Avoid barber-pole effects in plugs, and anything that is unlifelike in hue and shade. Scale finish lures are very popular and are well worth studying for selection. The perch and pike scale finish are probably the best.

Trade names are given on plugs illustrated with this article. They can be identified by name in any tackle shop. Names of the manufacturers will be furnished by Modern Mechanix & Inventions Magazine *if stamped reply envelope is included.*

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A Radiophone Diving Helmet

[*Continued from page* 93]

A shut-off valve is placed near the top of the helmet. It should be threaded to take a garden hose connection. A short length of chain is fastened to the top of the helmet for the safety line. This completes the helmet with the exception of the lead weights. The size of the weights will have to be determined by experiments.

Radiophone Built Into Helmet

The radiophone set is made from radio earphones, with a 4½-volt "C" battery for power.

One earphone is sufficient for both receiving and transmitting in the helmet. If the earphone is loose enough on the ear it is only necessary to speak into the helmet and the sounds will be picked up. Otherwise an earphone may be attached to the top of the interior of the helmet. The phone wires may either be run under the helmet or through a hole that is made water tight with a packing nut. Small rubber insulated wire should be used, and it should be wired at intervals to the air line. The earphones should be taken apart and wax poured in around the magnets, to make them waterproof.

Use Large Size Pump

The type of pump used depends upon what is available. The one shown was picked up in the junk yard. Whatever pump is used, it should be large enough to give a sufficient volume of air at a high enough pressure for the depth being explored. It may be found necessary to use a supply tank and check valves if the pump is not large enough otherwise. Three or more ordinary auto tire pumps arranged to operate in parallel are used extensively by amateur divers.

Ordinary garden hose is used for an air line. A rope should be attached to the chain on the helmet and wired to the hose at short intervals. Enough slack should be left in the hose at the lower end to keep it from kinking.

Several coats of copper paint give a neat finish to the helmet.

An air release valve is not necessary, as excess air will escape from under the helmet. The safety rope is extremely important. With inexperienced persons, who may lose their balance under water and become frightened when the helmet slips off, two safety ropes, one to the helmet, and one to the waist of the diver, should be used.

Blue line prints **for this Radiophone Diving Helmet, containing all sketches enlarged many times, reproduced on tough white paper for workshop use, are available here at 50c postpaid. Order from Modern Mechanix Publishing Co., Minneapolis, Minn.**

Police Declare War On Killer Cars!

[*Continued from page* 33]

speeding. Tickets were handed out wholesale. For four weeks, the siren sang out so often that drivers on this road were completely reformed.

During the month, not a single death occurred. This showed what speed has to do with safety—stop speeding and you stop death.

Speeding May Slow Up Traffic

A recent survey made by the Automobile Club of Southern California showed that speeding up cars does not necessarily increase the rate of traffic flow. Studies proved that at speeds greater than 23½ miles per hour, the safe distance between cars increases so rapidly that it more than offsets the speed with which traffic moves; in fact, it actually may reduce the number which will pass a given point with safety.

For example, a traffic lane may accommodate 2600 cars an hour, moving at 23½ miles; but if the cars speed up to 45 miles an hour, only 1760 cars an hour can pass. The safe distance between cars has more than doubled and the capacity is now 1760 cars an hour. The club has also learned by experiment that in a drive through city traffic, a car going thirty miles an hour gets there just as soon as one travelling forty-five or fifty.

However, to reform the habits of motorists and pedestrians so as to benefit from these discoveries is a real problem. Psychology is an efficient aid in this work. In one city, police had great difficulty in making pedestrians obey traffic signals, as required by a new law. Like a flock of chickens, jaywalkers would scatter through heavy traffic and cross without regard for signals or the extreme risks they were taking. Officers were helpless. Then they tried strategy.

Embarrassed Pedestrians Heed Signals

Instead of trying to give each erring pedestrian a ticket, the officer simply blew his whistle loudly and motioned him back to the curb to await his turn. Amusement and derision of spectators discomfited the jaywalker. By turning the laugh on the violator, the officer readily enlisted crowd sympathy on his side, and soon pedestrians were following signals obediently.

Radio stations WHB at Kansas City and WTCN in St. Paul are a few of those now broadcasting traffic court sessions. The broadcasts are popular with radio audiences, and are impressing traffic laws on thousands of citizens.

Drivers are sent to traffic school in many states. California requires that every ninth-grade high school student be made familiar with the Motor Vehicle Act.

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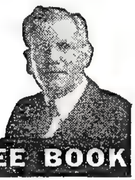

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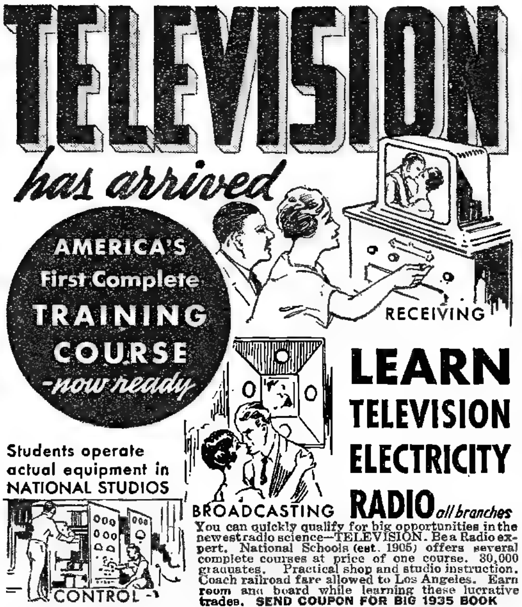

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A Semi-Log Cabin Home

[*Continued from page* 100]

threshold to assure ample door clearance. The windows are single sash and should fit in casements, as shown in Fig. 5. They are hinged the same as the doors and fit up close to the outside stops. Window sills are made of tapered 2″ by 6″ material to permit water shed. A priming coat of linseed oil or paint should be put on all doors and windows as soon as they are hung to prevent warping. Detail porch construction is shown in Figs. 12 and 13.

The pressed wood may now be put on, and as it comes in large pieces, it is a job that is quickly done. Be sure that you buy the kind that has one side already sized. This hard, or sized surface, faces out, flat to half-logs and will take paint with very little absorption. Pressed wood, sold under various trade names, should be purchased in 8′ by 4′ size.

Building Interior Partitions

Lay the four interior wall surfaces first, then box in the gable ends and use the resulting waste for finishing the porch. Nail the pressed wood with six penny box nails spaced about three inches apart and be sure to leave a gap of about $\frac{3}{16}$″ between each panel to allow for expansion. Cover seams with ¼″ by 2″ strips and lay base boards, as shown in Fig. 11. The interior partitions are built in the conventional manner with 2″ by 4″ joists boxed in with pressed wood.

The chimney is set on a substantial stool 5′ above the floor with the resulting space below used for shelves, as shown in Fig. 7. Seven bricks are used for each chimney course with about four and one-half courses to the foot, so you can figure out how many bricks you will need. A 5-inch stove pipe opening should be left in the chimney and a sheet metal nipple inserted. Roof flashing of tin or copper should be worked in between courses at roof line to prevent water leaks about the chimney, as shown in Fig. 9.

Painting and oiling is next in order. Clean floors thoroughly by sweeping and apply a liberal coat of hot linseed oil, be sure that the oil is hot as the heat increases its penetrating qualities. The half-logs on the exterior may be either varnished, oiled or painted. The exterior of pressed wood should be given two coats of outside paint.

BLUEPRINTS FOR SEMI-LOG CABIN

Enlarged blueprints of all illustrations appearing in the above article, printed on tough paper, can be obtained for $1.00 postpaid. Address orders to Modern Mechanix Publishing Co., Minneapolis, Minn.

Grappling With Death Under Sea

[*Continued from page* 38]

Hook and into the harbor, but it was a three day fight. You don't forget things like that very soon.

I remember another time about ten years ago when the United States submarine S-51 was rammed and sunk by the coast passenger ship City of Rome off Block Island, R. I. When I went down to her, in fairly deep water, there wasn't a chance that the men inside could be alive.

She was lying there with her belly sunk pretty far down in the sand—too deep and heavy to be raised without spending a lot of time. It was pretty dark down that deep. I finally cut a hole through her hull, and going into her sort of felt like going into a tomb.

Brought Up 33 Bodies

But it was a part of my job, and I went in and felt my way around. Of course they had all been dead a long time. I brought 33 bodies to the surface.

During the past eighteen months I have been engaged as Submarine Inspector on the San Francisco-Oakland Bay Bridge. My duties on this construction work consists of testing and reporting on foundation conditions under water. The water at the base of bridge foundations where I must check conditions is so murky that vision is impossible. I therefore tap with a metal rod, feel surfaces of the concrete and rock foundations with my bare hands. From a combination of the sound of the surface as it is tapped with the rod and the feeling of the objects I have touched, I make a report by means of a specially designed telephone within my helmet to the engineers above of my discoveries.

Describes Harrowing Adventures

The deepest dive on the San Francisco-Oakland Bay Bridge job and on any other underwater construction job, as far as I know, was between Yerba Buena Island and the Oakland shore. That was under pier E-3. The water isn't so deep there, about 40 feet. But we had to go down more than 200 feet to get a good solid foundation for the pier that holds up one end of the cantilever span.

The caisson was a false bottom type. After the caisson hit mud, the false bottoms in the dredging wells were ripped out, and the mud was pumped and dredged out until the hole in the bottom of the bay was about 200 feet deep. It was my job to go down into the water filled hole, 245 feet under the surface, thereby making a world's record for deep water diving on any construction work.

I had a very harrowing experience when working alone at the bottom of San Francisco Bay during the moving of the Pacific Tele-

[*Continued on page* 129]

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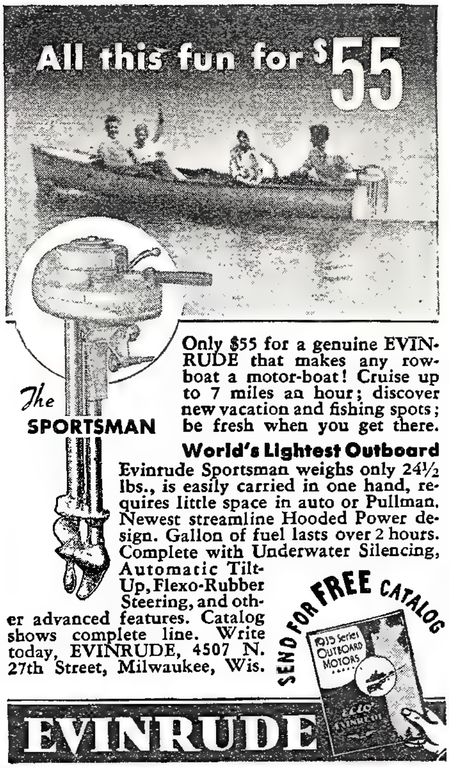
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Simplify That Task of Fish Cleaning

[*Continued from page* 71]

the slime by scraping a knife against the grain where the scales lay. Then clean the fish under a cold water tap, rubbing with the hands until the surface is absolutely clean.

A long slit, one-half inch deep, is then made along each side of the dorsal fin on the back. After this, by grasping the back of the fin, it can be removed from the flesh with little effort. Remove the fin from the under side of the fish likewise.

This done, the fish is ready for planking. Place the cutting edge of a sharp knife next to—and horizontal with—the backbone, and sever the flesh close to the bone on both sides from top to tail, leaving two steaks with no bones in them but the ribs. If desired, the ribs can be cut out by slipping the knife above the ribs to cut away the meat only.

The finishing touch to remove all bad taste, not eliminated by bleeding, scraping, and boning, is a ten-hour salt pack. Contrary to common belief, fish should not be thrown into salt water. Like any other meat, it will absorb water and become soggy. Fish steaks should be merely salted while moist, packed in a bowl, and put on ice for about ten or twelve hours. And then they are ready for the pan and a delicious fish dinner.

Completing "Nomad"

[*Continued from page* 120]

then wrapped very tightly with pinked edge airplane tape. This is the type of tape that you see over the ribs in an airplane wing. It is best to have the roll of tape at least ten feet away from the spar so that there is a long distance of tape to stretch before it goes on the spar after the spar is taped it is given two coats of airplane dope and then varnished with several coats.

The boom (Fig. 13) is made in rectangular section wider at the after end than at the forward. Waterproof plywood is glued on the ½″ sides and the whole structure is glued together with casein glue. The sail track can be bought at marine hardware stores.

All standing rigging for both rigs should be one-eight inch cable of the galvanized and stranded type. The running rigging is of one-quarter inch diameter cotton or Italian hemp for both rigs.

The racing sails are made from grade A cotton fabric used for covering airplane wings. The cruising rig will carry sails made from twilled muslin or white denim.

Blueline prints of *Nomad* to stand rough handling in the workshop are available at $3.00 postpaid. These prints contain both installments, including full instructions and all drawings greatly enlarged. Send your orders to Modern Mechanix Publishing Co., Minneapolis, Minn.

Grappling With Death Under Sea

[*Continued from page* 127]

phone and Telegraph Company's telephone cables.

Alone, 100 feet under San Francisco Bay with my knee on an iron sawhorse, a hack saw in my hand, and surrounded by many tools of various kinds, I sawed away at a huge 1200-wire telephone cable.

To cut the cable I required as great freedom of action as possible, and that meant slack water and no tides. But in the hour and a half needed to cut a 1200-wire cable and direct the raising of its ends to the barge for splicing and moving 1000 feet north, there was risk that I would be caught in the swift bay tide, which swings along at five or six miles an hour.

Reed Is Caught By Tide

And I was caught that way one day. The tide was beginning to pull at my suit and to impede my hands. Gritting my teeth, determined to finish the job, I wrapped one of my legs around the iron sawhorse and kept working.

But the swirling tide made a plaything of my safety rope. It entangled. When I finished my work and was ready to ascend to the surface, I was caught. Making a quick decision, I cut the safety rope. Only the rubber hose supplying me with air was left now by which to pull me to the top. A weak spot in the hose, a jerk of the tide, a split in the rubber and the water would have filled my diving suit. But the rubber hose did not break, and I was pulled to safety.

Cuts Air Hose to Escape

When the schooner Lynch sank in the Hudson River, I descended for the purpose of clearing the rigging preparatory to the work of removing the schooner. While carrying on this work one of the masts of the vessel was carried away fouling the life line and air hose to such an extent that it was impossible for me to clear them. I was able, however, to pull through sufficient slack to enable me to reach my lines on the other side of the wreckage. Then cutting my air hose I pushed the end up the cuff of my diving suit which supplied me with air enabling me to reach the surface in safety.

For the purpose of facilitating my diving work I have designed and equipped a barge on which is installed practically every facility required for deep sea diving. It includes a steam room and massage department which is in charge of a specialist, who goes into action the instant I leave the decompression chamber after I have made a deep dive. This chamber is equipped with bed, telephone and other devices that contribute to the comfort of those using it. At the end is a medical chamber by means of which food or medicine may be delivered to the interior.

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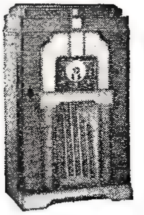

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America's Part In Soviet Triumphs

[*Continued from page* 84]

The completion of the Dnieper dam, with three 40-foot navigation locks, makes navigable a waterway linking the Black Sea with the Baltic—a project discussed and dreamed of by engineers of the old regime in Russia for centuries.

First in the world as regards the use of airplanes in forestry and agriculture is Soviet Russia. Not satisfied to wait until ground is dry enough in spring for tractor sowing, U. S. S. R. farmers spread seed from planes at ten times the speed of ordinary planting equipment. Almost 500,000 acres of land were sown in this way in 1934.

Airplanes Chase Frosts

Airplanes have been used effectively to spread smoke clouds in fighting early frosts in orchards and gardens. Airplane dusting has cleared almost a million acres already, of both farm and forest land, from insect pests.

On a par with other nations now is the Soviet Union in aviation development work. All-steel, electrically welded planes, tailless craft, autogiros, gliders—countless other types of aircraft have been designed and built at TSAGI in Moscow, and at two other aviation institutes.

Umberto Nobile, former commander of the ill-fated dirigible *Italia,* is engineering consultant for the Soviet dirigible construction trust. Six experimental non-rigid and semi-rigid dirigibles have already been built and successfully tested; a 5,000,000 cu. ft. capacity rigid giant of the air, but little smaller than the U. S. *Macon,* is now being designed.

Moscow Gets Subway Line

The first 7½-mile long line of Soviet Russia's first subway line is now completed in Moscow. John Morgan, American consultant on this gigantic tunneling project, considers the Moscow subway superior in many respects to any underground railway in the world.

Pioneering in the manufacture of synthetic rubber on a commercial scale, Soviet engineers are now completing, in Armenia, a plant which will convert limestone and coal into a synthetic rubber of low cost and excellent wearing qualities, to be known as "sovpren."

The recently completed graphite and asbestos manufacturing plants, and the nearly-completed abrasives plant in the Urals, are probably the largest of their kind in the world.

American architects have willingly given of their experience and knowledge to Soviet Russia. Soviet and American designers worked together in planning the Palace of the Soviets in Moscow, to be the largest public building in the world. Actual construction is scheduled to begin this year.

Debunking Poison Gas War Scares

[*Continued from page* 48]

many into the World War at Ypres, the German General Staff was informed by chemists that the war would soon come to an end. Chlorine, a deadly poison, when released before the Allied position was expected to drift across "no man's land" and rout the enemy from its position. Once in the open the German troops would everwhelm the British and French. True the gas barrage was successful. But the Germans never followed up the attack with troops.

To the Chemical Warfare Service this experience of the Germans at Ypres with chlorine suggests the impracticability of its use in an aerial attack.

Mustard Gas Is Most Dangerous

Searching through old records belonging to large-scale commercial chemists and utilizing the world's most complete data on some 250,000 chemical combinations, the chemical engineers of the warring powers from 1916 to 1918 sought a perfect gas.

The net result of a couple of years search was mustard gas, and it is doubtful, most chemists of today are convinced, if any other gas will ever be discovered with more effective qualities as an attack chemical. Phosgene is no more deadly but is the lightest of all the gases and therefore requires enormous quantities for purposes of destruction. Phosgene is volatile, but not as volatile as chlorine. Therefore phosgene cannot be classed as a real lethal threat to civilian populations in time of war.

Simple Mask Needed for Chlorine

Since the simplest mask is protection against chlorine, the general public need not fear it as an important agent of destruction. Chlorine will kill vegetation on a large scale but salt will do a better job and far less expensively.

Mustard gas is not very volatile. It is a persistent agent which affects the lungs very much like phosgene and is deadly on long exposure to it. The real threat offered by mustard gas lies in its liquid form. When scattered on the ground it gives off a suffocating vapor. Both the vapor and the liquid burn. So that proper protection against mustard gas necessitates the use of gas-proof and fire proof masks and suits.

Fluorine, a newly heralded war gas, has no application to war either as an explosive or poisonous gas. Its effects cannot be controlled—that is, its time of explosion cannot be ordered. Though lethal properties are claimed for fluorine, this chemical is too light for field use.

One of the first things to bear in mind when you hear wild remarks about large-scale

[*Continued on page* 140]

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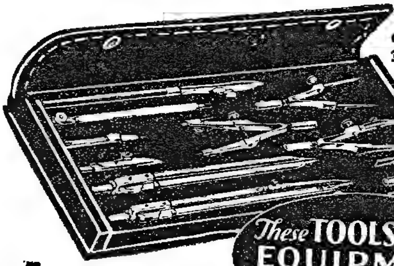

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Who Will Win Greatest Air Race?

[*Continued from page* 53]

Federation of Spain. In the United States both Government and private interests are tremendously interested. Distinguished names include William Gibbs McAdoo, wartime Treasury Secretary who is now head of the National Aeronautic Association, and Eugene Vidal, director of Aeronautics, Department of Commerce.

All Nations Invited to Race

"What is my purpose in launching the race? The main idea is to test out the world's finest kinds of equipment for aerial navigation. Certainly the contest should answer all major questions concerning just where the various nations stand today in aviation science. True, the London-Australia race of last fall, won by C. W. A. Scott and T. Campbell Black, British pair, had a somewhat similar aim. But that competition wasn't truly international. It was three-fourths British so far as entries were concerned. The great French flyers just couldn't get interested enough to compete; America had two pairs of flyers entered: Col. Roscoe Turner and Clyde Pangborn, who finished third, and Smith and Cochran, who didn't even start due to engine trouble.

"The 'Around the Americas' race, on the other hand, will include most of the great distance flyers of every nation. We hope to make it an aerial competition for the Western hemisphere the equal of which has never been undertaken in the history of aviation. The contest will cover the major portions of North, Central and South America.

Rules of Race Are Simple

"The race will be conducted under the rules of the Federation Aeronautique Internationale, the international body in charge of official air records, and with the sanction of the National Aeronautic Association. The N. A. A. is not promoting the contest; instead a non-profit corporation is being organized for this purpose, of which I am serving as managing director. I am being aided materially by Fred Roper, son of the Secretary of Commerce.

"Not yet have we had a chance to draw up all the rules for the great race, but we contemplate substantially a free-for-all competition that will be as simply organized as possible. Since the participation of European countries will be invited and since aircraft regulations elsewhere are not uniform with those of the United States, we feel that the best results can be obtained by leaving the specifications as wide open as possible.

"The sky is the limit on the number of entries. However, it is hoped to have at least 100 flyers, representing the cream of the crop

Who Will Win Greatest Air Race?

among the leading nations. None of them have yet been approached officially, but we expect to line them all up within a couple of months. No restrictions will be outlined, according to our present plans, as to the participation of government flyers of any nation, although whether their governments will permit them to enter the race is of course quite another matter. However, this much is hard and fast: no plane built with military funds or specifications will be allowed to participate.

"The long hop will total about 18,500 miles. It won't be a non-stop affair. Flyers will have to follow the prescribed course with about 25 major stop points. They will have to check in and check out of each of these contest points.

"Four major prizes will be given: $50,000 for the fastest time; $25,000 for the second fastest; $15,000 for third place; and $7,500 for fourth place. In addition numerous 'lap' prizes will be put up by various private interests for best time on any given lap, as for instance, from Los Angeles to San Francisco; furthermore, a prize will be awarded for the speediest transcontinental hop. Thus it will be possible for entrants who by reason of accident or delay are substantially out of the running in the main contest to win considerable sums of money nevertheless."

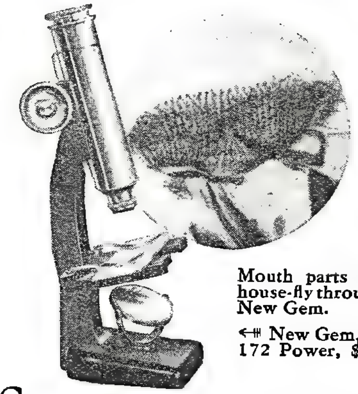
Examine Flowers With Microscope

[*Continued from page* 63]

alcohol. Next day, in the same manner of manipulation, wash for one-half hour in fresh 95 per cent alcohol, then into xylol for a similar period and finally into thin balsam. A slide may now be prepared at any time by stirring this balsam with a needle and mounting a drop or two. Small seeds may be carried through in the same way, although it may be necessary to puncture seeds with a fine needle to admit the reagents.

Following such an introductory study, try some of the more bizarre and unusual types of flowers, fruits and seeds. Through the microscope, look at the prongs and hooks on cockleburs, beggar's lice and stick-tights, fruits designed for dispersal by animals. The modified leaves of the sundew and venus' fly trap, insect-eating plants, are weird indeed. Grasses and grains have flowers so small as to be practically microscopic.

There is an interesting series of modifications in the great composite family, including such forms as the daisy and sunflower. What one naturally presumes to be a single flower is really not such at all, as your microscope will show you. The floral head actually consists of a complex assemblage of very many but tiny separate flowers.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Teach Your Dog These Tricks

[*Continued from page* 57]

to commands. Catching a ball is an interesting trick to watch and is a game to the dog. A soft or sponge rubber ball should be used. Have him sit down, then back away a few feet. Show him the ball, say "watch," then with one downward swing toss the ball to him, saying "catch."

Dead dog is an amusing stunt, and is accepted by our pupil as a rest period. Command him to "lie down," roll him on his side and gently rub his stomach. He will relax and lie on his back. Say to him "dead dog." Gently place a hand over his eyes, and he will close them. Do not keep him in this position long, but command "up, good dog" and reward him.

Teach "Rolling Over" Trick

Rolling over is also an amusing trick, especially when done quickly. Have the dog "lie down," and while carefully rolling him over, command "roll over." Follow this on completion with "up" and a reward.

A dog may be taught to make himself useful around the home by delivering articles from one member of the family to another. When he has learned to carry, take him upstairs and offer him a folded newspaper. Tell him to take it to dad or mother, who may be in the living room or kitchen. Have them call him saying "bring it here." Repetition will impress the names of persons or articles on the dog's mind.

Dogs Pray Seriously

Saying prayers is a trick easily taught, and from outward appearances is taken seriously by the dog. Place him in front of a kitchen chair and have him sit down. Gently take his front paws and place them on the chair. Push his head down on his paws and hold it there a few seconds, commanding "say your prayers.". It may be necessary to say "steady" to him, if he refuses to stay in position. When you are ready to let him down, say "Amen—good dog," and reward him. In a short time all you will have to do is point to a chair and tell him to say his prayers.

Once he masters this much of the trick, he may be tried in the center of the room. It is best to support him until he learns to balance himself perfectly.

An amusing trick to be added to his repertoire is that of sneezing. Take a fluffy feather and tickle his nose with it until he sneezes. Reward him and encourage him to repeat.

Teaching a dog to walk and waltz, standing up on his hind legs, is a more difficult trick and requires a longer time. The dog should be tempted with a tidbit to induce him to stand. It is necessary to support him for

[*Continued on page* 142]

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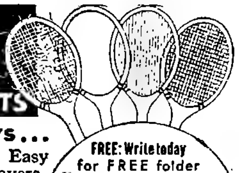

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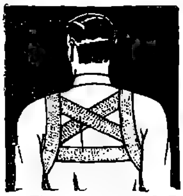

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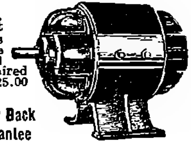

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Debunking Poison Gas War Scares

[*Continued from page* 131]

"gassing of cities and civilians," according to the experts of the Chemical Warfare Service, is that, as yet, no aerial gas attacks have ever been made. There were none whatever during the World War. In addition to overcoming such defenses against air raids as aircraft guns, attacking planes, smoke screens and dirigibles, it is absolutely essential, in launching a successful gas attack, to have almost ideal conditions of wind and weather.

Night time affords the most desirable conditions for a gas attack. During the night or in the early morning hours, strong winds and ascending air currents are at a minimum. Foggy and cloudy weather are advantageous in keeping the gas on the ground. Heavy rain almost always washes out the destructive effect of poisonous vapors, while woods, grasses, bushes, trees and buildings serve to retard their movements.

Aerial Gas Attacks Unlikely

All these things point to one rather obvious fact and that is—most aerial gas attacks are doomed to failure. Where civilian populations are concerned, training of every man, woman and child is urged by most of the world's leading powers. In Europe danger from gas attacks is considerably greater than in our section of the world. There great and powerful states, regarding each other distrustfully have more reason to be fearful of sudden aerial gas attacks. Here, on the other hand, we have peaceful neighbors on the north and south and oceans on the east and west.

It is not surprising therefore that in the great centers of Europe the public is taught protection against all types of poison gas. Especially devised masks and suits are being tried out on a large scale. In Berlin and other great national centers, enormous underground tunnel networks have been constructed to which the civilians may retire, not only from aerial gas attacks but from aerial bombing as well.

In this country there is little occasion for preparation, the Chemical Warfare Service contends. Certainly there is no reason for alarm about our cities being wiped out by a gas attack from enemy planes. In the first place thousands of planes would be necessary to accomplish the attack. And, in the second place, from a military standpoint an aerial onslaught of this sort would be of questionable value.

Uncle Sam Fights Black Blizzards

[*Continued from page* 60]

Kansas actual measurements showed that from 40 to 80 tons of soil per acre were blown from the land in recent storms. A pan of water placed in the open showed that three and a quarter tons per acre had been dropped.

"There are two reasons for dust storms," H. H. Bennett, director of the Federal Soil Erosion Service, explained. "One is the terrific wind while the other is loose soil, caused partly by drouth and partly by improper farming methods. Continued planting of wheat, alfalfa and other deep-rooted plants has depleted the stored moisture of the top soil to such an extent that when drouths occur there is insufficient moisture for a crop."

Dust Turns Day Into Night

Not only was the dust storm of March, 1935 the greatest in our history, but it presented many peculiar, devastating and dangerous features. The scourge of the West and Southwest turned day into night for an entire week in farms and towns of Kansas, Nebraska, Oklahoma and Colorado. Blanketing Missouri and fertile Kansas, it reached as far as Washington, D. C., where it fogged the nation's capital.

Dr. A. C. Fay, bacteriologist at Kansas State college, pointed out that dust storms carry a serious threat to health. He found that a plate of glass exposed 10 times during one storm collected 70,000 dust particles per square foot for each moment of exposure. Of this number, 24,000 carried bacteria.

To combat dust storms Governor A. M. Landon of Kansas suggests plowing furrows at right angles to the prevailing prairie winds so that the winds will be encouraged to drop their loads of precious top soil. Experts at the various experimental stations in the stricken areas already are testing this plan.

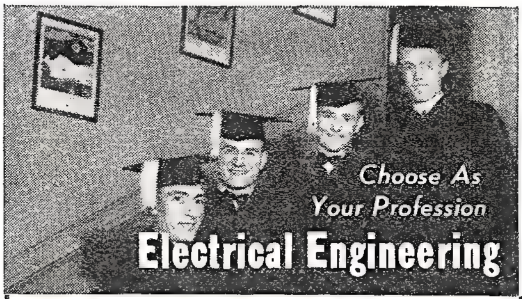
Plans Outlined to Save Soil

Lake and pond digging to conserve water is advocated in Oklahoma by Governor E. W. Marland and is being sponsored by relief units in various Great Plains states.

A plan for general contouring of abandoned farms and wide row planting of sorghum to hold the soil and moisture is being introduced in Texas by H. H. Finnell, director of wind erosion control.

Tillage to roughen the surface of bared fields and bring heavy clods of clay subsoil to the surface to halt wind erosion, pending more permanent measures, is sponsored by the Federal Soil Erosion Service.

To carry on these plans of battle a vast army of 116,000 CCC recruits already have taken up arms in the greatest peace-time warfare America has ever fought against that arch-enemy—the Black Blizzard.



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Big Money Awaits Lucky Inventors

[*Continued from page* 81]

to the low-priced clip chains now being sold. What is needed is a clip that can be slipped quickly around a wheel. It should be adjustable to tires of different diameters.

Most breakfast foods and other packaged commodities are being sold in wax paper and cellophane wrappings. What is needed is a method of placing the paper to permit easy removal.

Another needed invention for furniture is a caster suspended on a single ball bearing.

A pants-hanger which would grip the trouser legs under the cuffs and prevent their falling would be a winner.

A hand mechanism driven by friction alone and designed to remove varnish when rolled over flat surfaces is needed.

Who can bend a paper clip in such a way that it will not have to be turned around to be used? In short, the clip should be available for immediate application regardless of its position. A truly universal clip would bring its inventor $50,000 a year.

The inventor who will earn fabulous sums will be the man clever enough to make up a low-priced electric utensil heater which can fit in the bottom of a tea or coffee pot.

Teach Your Dog These Tricks

[*Continued from page* 135]

some time, because of the tremendous strain on the muscles of his back and legs. While in the upright position he should be commanded to walk, by gently leading him a few feet. With bits of meat, coax him in circles, commanding "waltz." Gradually reduce the size of the circles, until he acquires a short turn around, or waltz. Periods of rest should be frequent, and rewards generous.

Rarely ever does one see a dog that has been taught to back up. This is an apparently clever trick to watch, and sometimes may be considered practical. Prepare a movable partition, preferably of wall board about six feet long and three feet high. Hold it just far enough from a wall to permit the dog to stand comfortably between board and wall, facing you, but do not leave enough room for him to turn around. Command the dog to "back up," lightly stepping on his toes. Control him so that he does not suddenly jump over the partition, and reward when he completes the trick. A little patience and repetition will make him perfect.

Any questions which readers may have concerning the care and training of their dog will be gladly answered free of charge by Mr. Craig, author of this article. Address him in care of Modern Mechanix and Inventions Magazine, Minneapolis, Minn., being sure to enclose a stamped, self-addressed envelope.

Furnaces Cool Modern Home

[*Continued from page* 65]

itinerant disease germs. There is ionization by cosmic rays from space, from radio-active minerals in the earth, and there is ultra-violet light from the sun.

"In the big cities, especially indoors, these natural conditions no longer exist," he said. Ozone is missing, ultra violet rays are filtered out of the sunlight by smoke, and the ionization is reduced, especially indoors, by the respiration of occupants of a room.

"Many believe that stuffiness and lack of vitality in indoor air are caused mostly by the destruction of the electrical ions which exist in pure air."

Furnaces Now Wash Air

While scientists experiment with "super-air," engineers are making constant improvements in air-conditioning apparatus, particularly for the home. "Weather rooms" are becoming part of the modern house.

The old hot air furnace is being revamped to serve as a year-'round air conditioner. In one popular conversion an electric fan in the furnace circulates filtered, washed air through the entire house at all times of the year.

In most homes, summer cooling can never be as efficient as heating without the use of refrigerating equipment. Where homes have cool basements, however, a forced air system will give greater comfort, the mere movement of the cooler air through the house being enough to improve the humidity.

Air Conditioner Buying Tips

In an endeavor to take the guess work out of home air conditioning, the Society of Air Conditioning Engineers has prepared a set of questions which the home owner should ask before purchasing any air conditioning equipment. They are:

1. *Will the apparatus heat the air in my room or building to a temperature of seventy degrees Fahrenheit when the outside temperature is zero?*
2. *Will it maintain a relative humidity of forty per cent at all times during the heating season?*
3. *Will the air introduced or discharged by the system be clean, containing not over 2,500 dust particles per cubic foot of air with a magnification of 100 diameters?*
4. *Will the equipment cool the air at all times during hot weather so that the temperature indoors is not above eighty degrees Fahrenheit or the relative humidity above sixty per cent?*
5. *Will the air be distributed without objectionable drafts to the occupants?*

These basic requirements, engineers declare, apply to any size of interior, to unit as well as to central systems.

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INVENTORS – See page 12

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The Man On the Flying Trapeze

[*Continued from page* 43]

chanic; and is also very particular as to size and condition of his net.

How Ernie Lane Met Death

The idea that we are safe just because we have a net beneath us is erroneous. The net did not prevent two men I knew from being killed. There was that little Japanese acrobat in Paris, that time. He landed in the net in proper shape, but the rebound threw him forward on his face, with his feet in the air, and broke his back. He was a novice; not so Ernie Lane, a top notcher and one of the Ward Flyers. We were at a dress rehearsal in Chicago, in 1922. He had missed a difficult trick. Eddie Ward, instructor and owner of the act, lost patience.

"Better put some life into that trick," he said.

Lane was standing on the pedestal board, ready to leap into a triple somersault. "I'll put life into *this,* you big stiff!" he replied, under his breath.

He shot into the air and made his three revolutions; but he didn't allow for the resilience of the new ropes with which the old wires on the trapezes had just been replaced. He went too high, throwing the trick out of Ward's reach. He kept turning, finally landing on his head in the net. He died 27 hours later.

Acrobats Dread "Casting"

Lane could have saved himself if he hadn't cast. Casting is our greatest dread; for it has killed more acrobats than any other one thing. It is that horrible state in which your mind and body have ceased to function. You whirl in space, lost and helpless. If you can't break out of a cast, and there's only a split second in which to do it, you must take what comes. We don't know why we cast. Perhaps from worry, carelessness, or fatigue; but *something* snaps in two the concentration our very life depends upon.

Clarke and I are the only performers doing the double full twister; Clarke and Cordona the only ones who can do a triple somersault. Three somersaults to a catcher is the limit so far.

Mrs. Arbaugh catches for me in the double full twister, which is remarkable for a woman. Ordinarily, the momentum of the leaper lightens his weight; but in this trick the impact is terrific. However, she does not catch me in a trick I originated—a full twisting somersault that is caught by the feet.

I have been with the circus for 27 years. Now and then I think I would like to try something else; but when the blue bird whistles in the spring, I'm all ready for the road again.

100 Locomotive-Power Normandie

[*Continued from page* 29]

is visible, indirect lighting fixtures of molded art glass being used to give this room a glamour and beauty never before achieved.

Twenty-three elevators will move passengers up and down the twelve-story ship, even though there are 3,500 steps connecting the different decks. If arranged in one vast flight, these steps would reach 1800 feet into the air, half again as high as New York City's Empire State Building.

On land twelve-story buildings are expected to remain perpendicular, at least while the elevators are operating. The *Normandie's* special elevators will function smoothly even in rough weather.

Normandie Gets Grey Flannels

The muffled creak of sliding metal and wood, as well as engine room vibrations, have annoyed ocean travelers heretofore. Fireproof, sound-absorbing grey flannel between all uprights and in the walls of the mammoth new ship will stop these noises and permit enjoyment of the peace and quiet of the ocean to an extent never before possible.

Truly a floating city, the *Normandie* can carry 2,000 passengers and a crew of over 1,300. For these there will be complete hospital facilities, including X-ray and radiotherapy equipment, medical and surgical clinics, and a drug store at which prescriptions can be filled. On overcast days, ultraviolet equipment in the different gymnasiums is ready to pinch-hit for the sun.

Chickens Roasted In Flocks

In the giant electrical kitchen is a range 51 feet long, taking 660 kilowatts of power from the ship's generators to supply 56 hot plates and 32 roasting ovens. As many as 768 chickens can be roasted at one time. A small army of chefs, cooks, bakers, and assistants prepare tasty dishes to be served in the 630-place main dining room, the 180-place open air grill room, and a host of smaller dining rooms.

Fifty-six lifeboats, two of which are powerful motorboats fitted with long distance radio transmitters and designed to tow the other boats, can carry every person on board. The newly-invented Maclachlan patent davits, which lower the boats in two minutes, keeping them always on an even keel, are operated by a single lever. Failure of electric current or steam power does not affect the lifeboat equipment.

For lifebuoys there is automatic throwing equipment, ready to throw from one to 12 life savers into the sea at the touch of a lever in the bridge.

Commemorating the launching of her greatest liner, France has issued a special 1.50 franc blue stamp depicting the *Normandie.*

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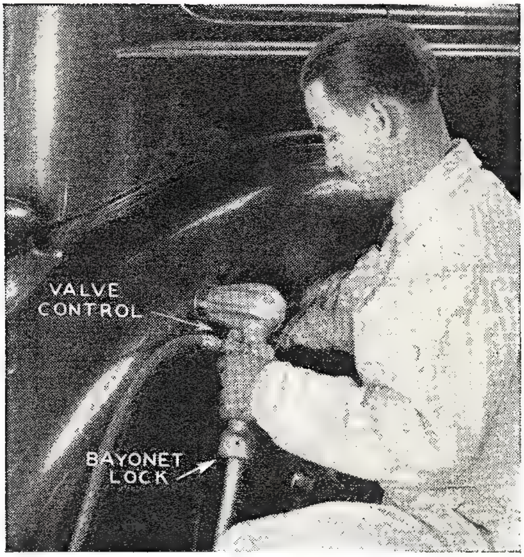
Helpful Gadgets Inspire Business



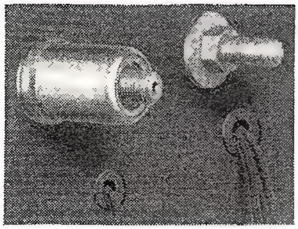
Pneumatic hammer, striking 4,000 powerful blows per minute, simplifies car body and fender straightening. Speed-regulated, equipped with eight changeable dies to fit contours of modern car, trigger-operated device is claimed to save hours of hand hammering. U-shaped metal yoke holds the die close to the hammer when used in straightening work.

A new dissecting instrument permits careful slicing of insects, plants and other specimens for preparing miscroscope slides.

A non-explosive paint and varnish remover is now being manufactured. The surface is sprayed or brushed with the liquid, washed with water and ready for painting when dry.

Liquid synthetic rubber, a product recently developed to replace liquid marine glue, is soon to appear. Unaffected by gasoline, oil or the elements, it will waterproof boat hulls.

A U. S. model submarine, which actually travels under its own power on or beneath the surface, is now available in a ready-to-assemble kit or completely assembled. Finished in U. S. navy colors, the model is 19 inches long. It was designed from technical plans.



A new lock, which insures against auto radio theft, is shown above. The base of the lock is tightened on the bolt which holds the receiver to the dashboard. A theft-proof shell fits over the base and is removed by spiral key.

An oil burner which fits in the fire box of any coal or wood cook-stove is claimed to eliminate the drudgery of preparing meals in a hot kitchen. The degree of heat is valve-controlled.

A new dictation transcribing machine embodies the latest principles of acoustics and is equipped with volume control.

Metal stilt steps, fastened to two lengths of lumber without the use of nails, screws or bolts, can be obtained by those interested in making their own stilts.

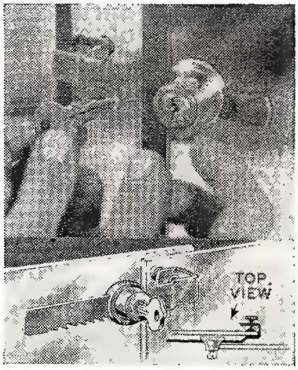
A plastic lining for stoves, ranges, furnaces and boilers is claimed by the manufacturer to save fuel and eliminate burned out fire-pots. Resembling modeling clay, the lining can be applied with the hands.

Tripod legs cannot slip on wet floors, hard or irregular surfaces and sloping platforms when nesting into three adjustable sockets which form the base.

A new machine for restringing tennis rackets registers tension of gut and is light in weight.

A harmless etching paste for glass permits home etching in two minutes. An aluminum foil stencil accompanies each tube.

An improved sighting disc for rifles provides for interchangeable apertures of seven different sizes for the shooter's selection. The center piece is unscrewed with a coin.



An adjustable, tamper-proof lock, recently placed on the market, protects glass display cases. The lock slides on a ratchet bar clamped to glass pane. It also may be used to lock all metal or wooden drawers.

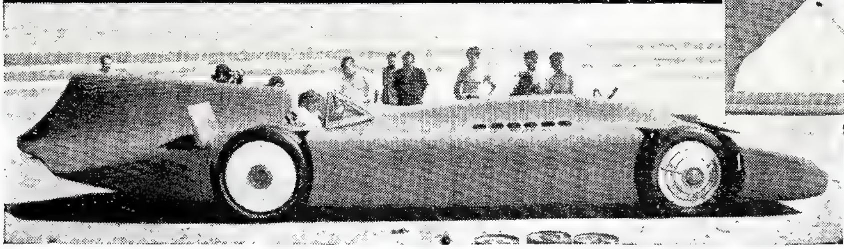
Insecticide container, attached to garden hose, permits spraying flowers and shrubs with ordinary water pressure.

Editor's Note — Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped, self-addressed envelope to MODERN MECHANIX AND INVENTIONS. *Manufacturers are invited to submit photos and literature for this page.*

SIR MALCOLM CAMPBELL ROARS TO FASTEST LAND SPEED EVER MADE, USING PYROIL

Sir Malcolm Campbell at the wheel of "Blue Bird," his $200,000 seven-ton automobile pictured below.

In driving at a speed of almost 300 miles per hour, Sir Malcolm said, "I used Pyroil in my Blue Bird world's record car and found it entirely satisfactory."



Thrilled as never before, the world recently watched Sir Malcolm Campbell, English race king, thunder across the sands of Daytona Beach, Florida, at nearly 300 miles per hour. Campbell's $200,000.00 seven-ton automobile carried him faster on land than any other man has ever gone. And in accomplishing this feat, Sir Malcolm used Pyroil.

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See article, "What Oil is Best for My Car," February 1935 issue of Modern Mechanix and Inventions.

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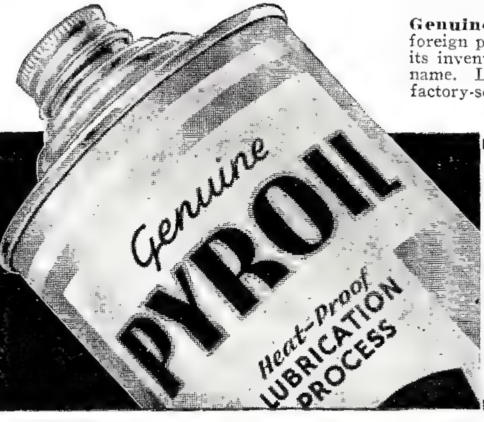

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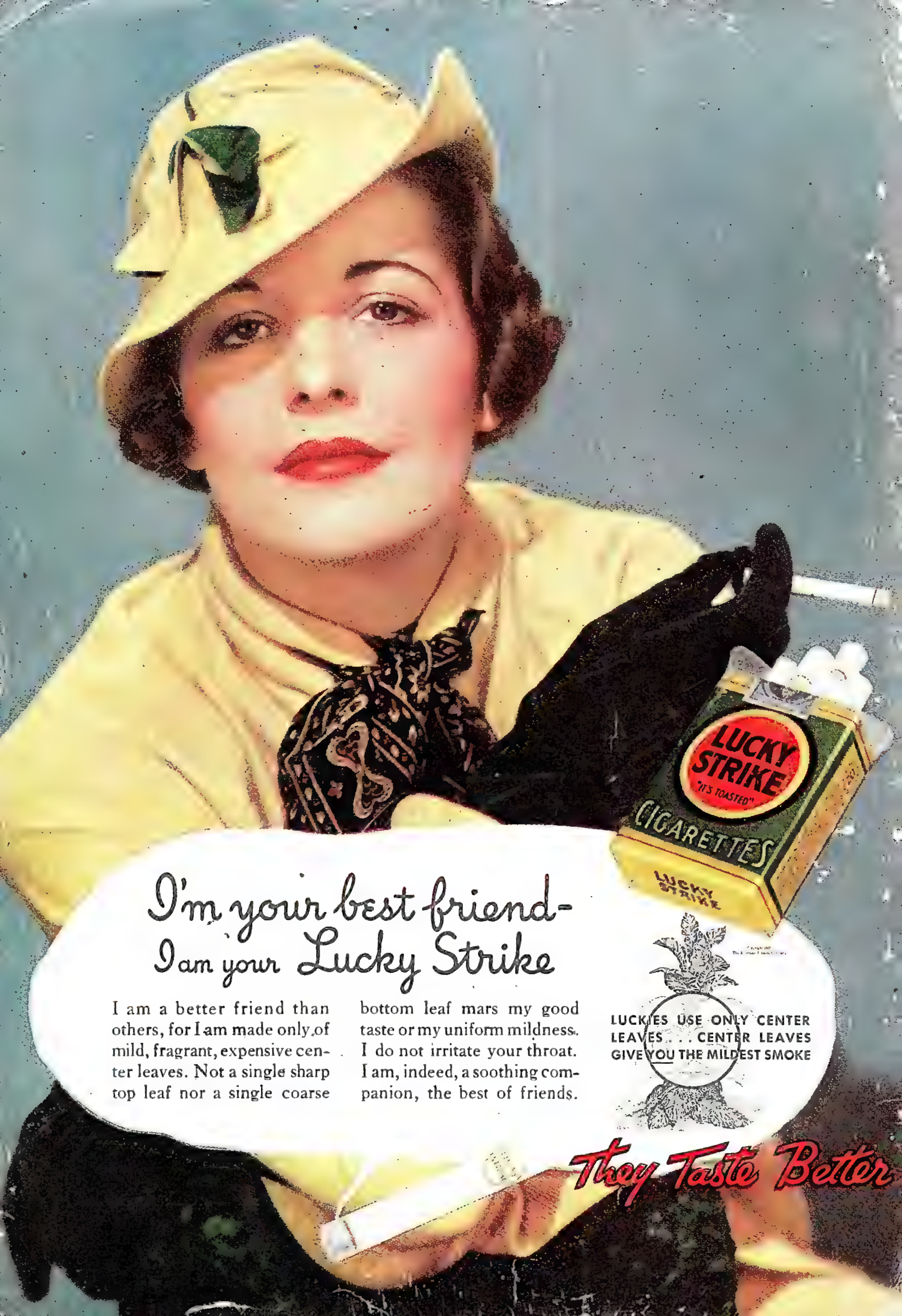

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A frank man to man talk about PATENTS-INVENTIONS -SELLING INVENTIONS

THE world of invention moves on. The Patent Office clerk who resigned his job back in 1833, because he said there was nothing left to invent, now stands out as one of the funniest men in American History. Think of everything that's happened in the last 100 years! Why, only recently the papers carried a notice that an obscure worker, Hans Wach, has invented a simple device to utilize exhaust steam on steam boats. *Already, the report states, the steam ship lines have saved more than $15,000,000 in fuel bills with his invention.* Almost in the same breath the Dept. of Commerce announces that it will soon test out a new, non-crashable aeroplane, which the average man can learn to fly in a day, which will travel at 110 miles an hour and sell at the price of a cheap automobile. An unknown Seattle man has invented a robot to go 5,000 feet under the sea and recover millions and millions of dollars worth of gold lying at the bottom of the ocean since the days of the early Spaniards.

Remember this: For every outstanding big invention there are thousands of small, simple things for use in the home, the office, the factory, on the farm, on every sort of travel conveyance. Little articles like you find on the counters of a 10-cent store, hardware store, drug store, toy and novelty shop.

Many Little Ideas Have Big Commercial Possibilities

A person finds something he's using doesn't work right, or it's clumsy, or costs too much. He gets a happy thought. He improves the old Article. That's contribution to human progress. That's the way that many, many men have reached the goal of financial comfort, independence and even wealth. Most of the things millions of us use didn't come from the brains of engineers and physicists. They came from the mind and maybe the crude home work bench of Mr. Average Man, busily engaged in earning his bread and butter at whatever chance or circumstance has given him to do. The "little" man's opportunity as an inventor was never greater than it is today.

Who Are Inventors?

You'd be amazed at the men we contact in the course of a busy year. Most of them do not consider themselves inventors at all. During their work or leisure they get an idea. They work it out on paper. They get in touch with us about Protection. Did you know that a dentist invented the stock ticker, a school teacher the telephone, a farmer the typewriter, an artist the telegraph? Did you know that the crinkly hair pin—sold by millions now—came about because a husband saw his wife twisting the old fashioned straight hair pin to make it stay in place? **Poor men who have no thought of invention now will be financially well-fixed in a few years because of a happy thought that the world could use to advantage.**

Can You Answer These Questions?

Ask yourself these questions: How do the Patent Laws protect me? What easy steps can I take, without cost, to put myself in position to support my belief that I am the *first* man to think of *my invention*? Is a Patent worth the cost? Do I need a model? Should I try to sell my invention before I have it Patented? Is there any safe, business like way to secure financial help? If I do apply for a Patent, how shall I reach people who can market my invention? Can I protect and sell an improvement on some invention that has already been patented? These are but a few of the questions which usually confront the average man. You need the answers! **YOU CAN HAVE THEM, without cost, trouble, or delay.**

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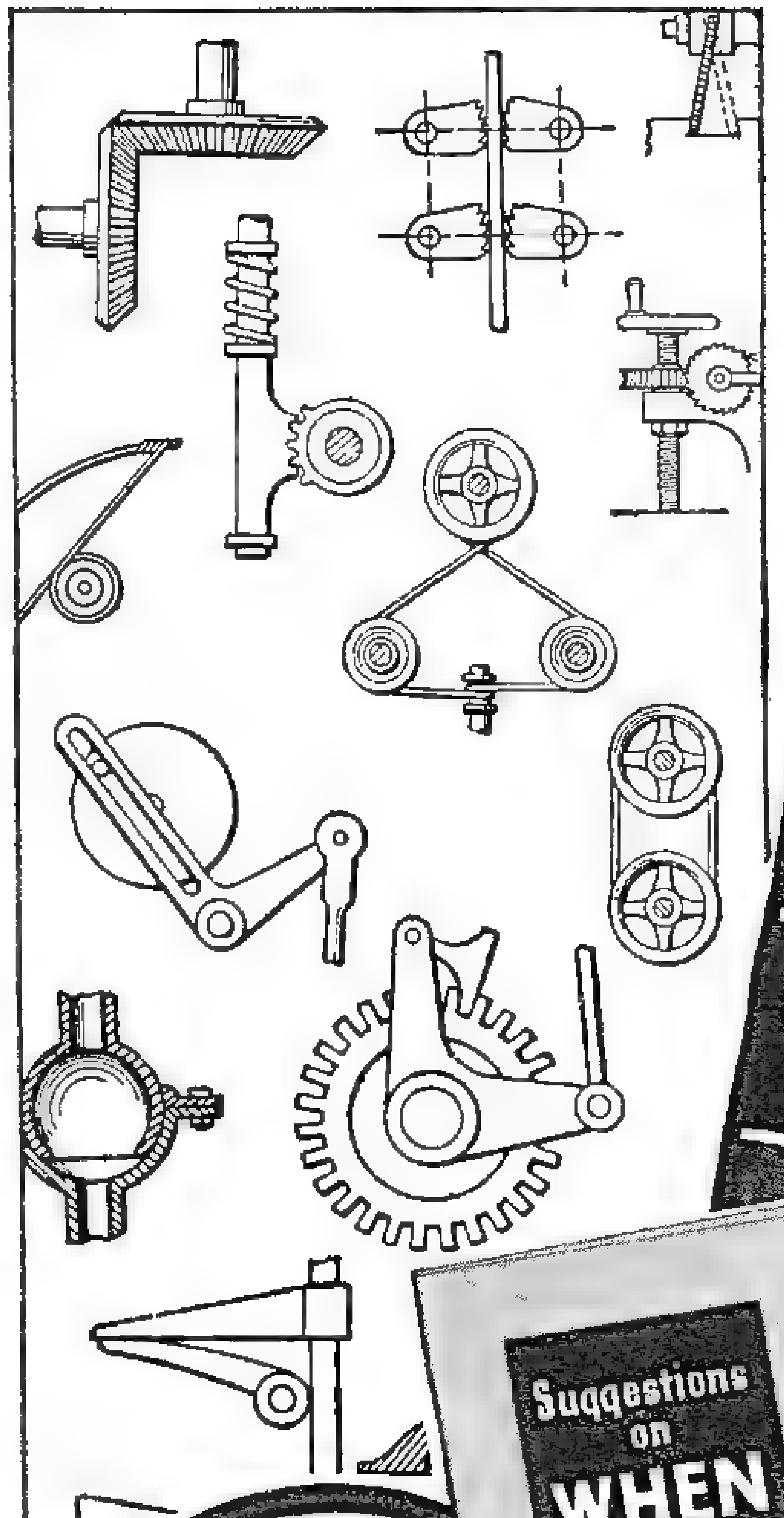

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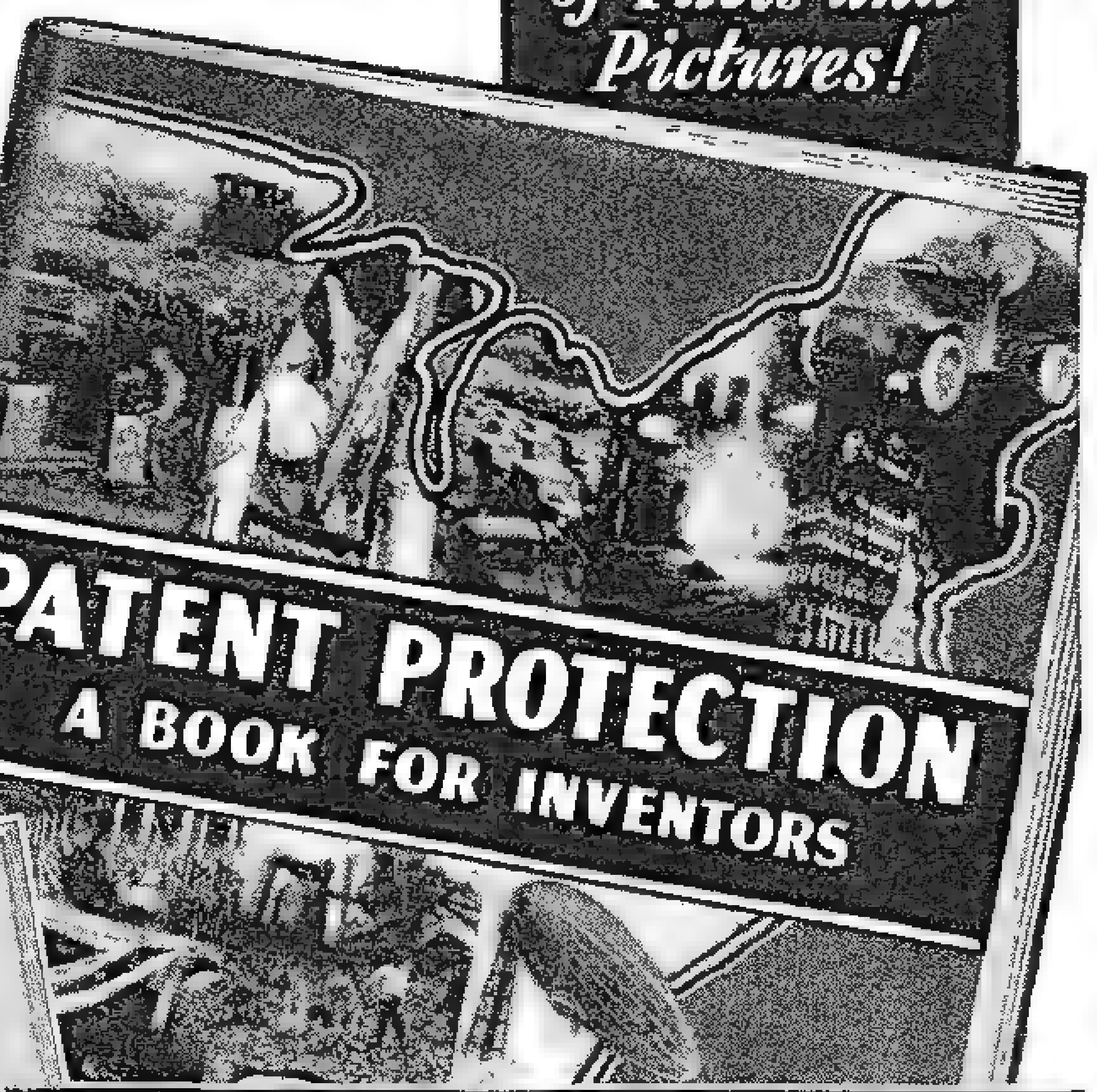

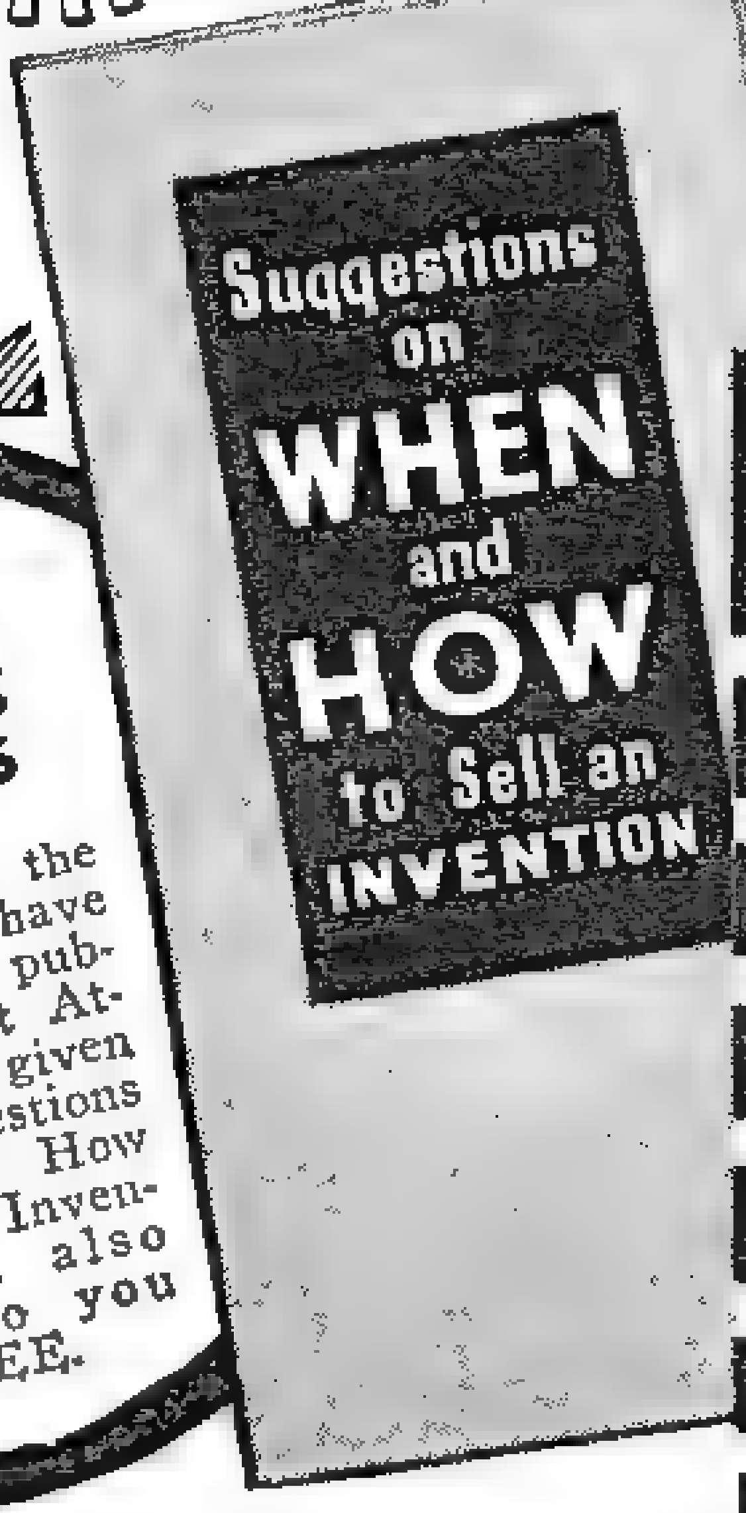

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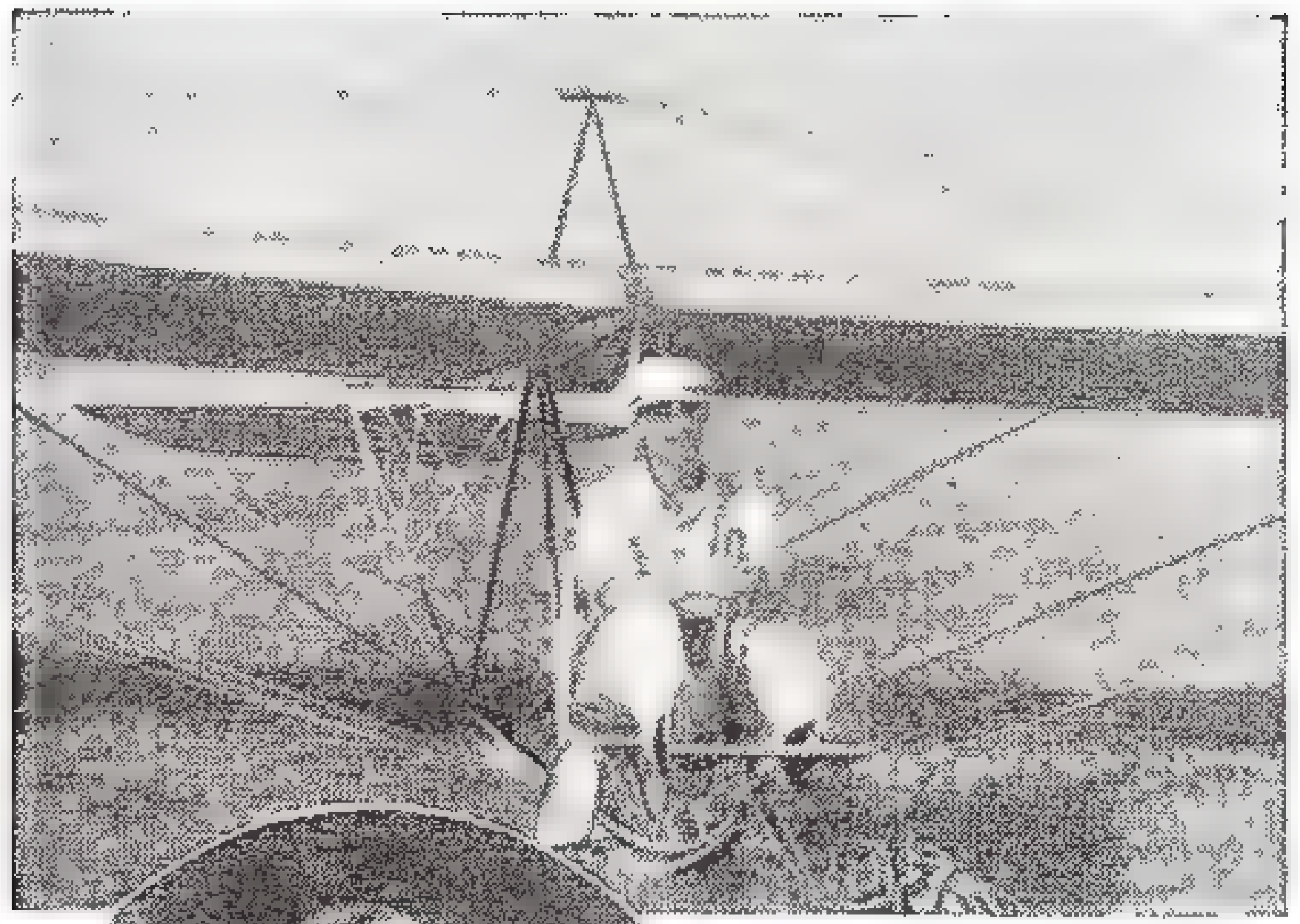
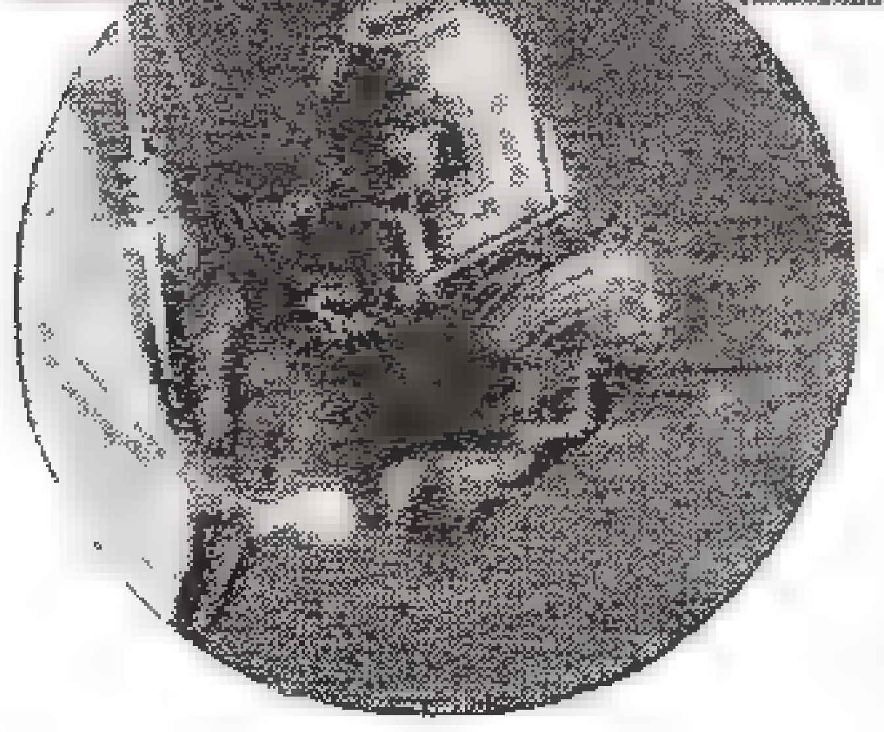
Random Chips from the Editor's Workbench





At left is Howard Johnson in the "ready-made" suit and the homemade diving helmet, in which he and his partner explored a river's bottom seeking gold nuggets. Johnson has also gone adventuring in the air. He has flown several planes and built three gliders, one of which is shown in photo above.

IN A 26-page hand-written letter the editor this month received one of the most interesting stories of adventure and humor that has ever come to the Workbench from a reader. It was written by Howard Johnson, of Turlock, Calif., whose adventures have carried him under water in search of gold and in the air seeking thrills. Johnson gets this month's first prize of $5.00. In our limited space we'll try to quote the best parts of his letter.

Turlock, Calif.

Dear Editor:

I am sending some snapshots for the Workbench contest. The diving suit was made by Arlis Riggs. The suits were purchased for $7.50 apiece. He made the helmets from the ends of an automobile gas tank.

We got the air check valve turned around backwards on one of the helmets and built up the air pressure in the suit until the fellow who was trying to go down was floating with his whole chest out of the water.

The suits were used to help get gold out of some deep water holes in a deep canyon. (Johnson explains that the diver went down with a suction hose through which gravel was drawn to a sluice box on a raft where the gold was separated.) We got started into the hills early in the summer, but it was late fall before we got the outfit working right. The whole thing was given up and we went to sluicing the gravel bars by hand.

We had some thrilling times though. I was the first one to try the suits on. I went down into the river about ten feet and thought I was on the bottom. I took two steps when I fell about ten feet straight down. I thought I was surely on the bottom then and started to wander around when I tripped and fell head first for about another ten feet. Boy, was I scared! The boys at the top tried to pull me up, but the safety rope caught on a rock. The one working the air compressor got scared and stopped pumping to help the other fellow pull. I finally managed to work down the river where they could pull me out.

I stayed until it got cold and then came down into the valley for the winter. The other fellow figured that if there was gold below the rapids it had to come through them. He worked right down inside of the rapids and cleaned out all the pot holes and made pretty good. He brought home some pretty good sized nuggets that would have started a gold rush if the miners knew about them.

I am interested in aviation also. The third glider I built performed quite well. The fellow who made the mining outfit bought a long wing biplane. He had the ship on one side of a ditch in a field and wanted to get it around to the back of the building where he could work on it. He hitched a team of horses to it and, when they looked back and saw the plane following them, they ran away and piled it up in the ditch.

I am going to make a parachute jump the first time I run across a good 'chute packer. If it don't open I'll make him let me try it over again.

Howard Johnson.

* * *

The model builders are represented this month by some excellent examples of their craft. Among them the scale model Monocoupe airplane, described in the 1935 "How to Build It," brought second prize of $3.00 to Edward Costello, who says:

Princeton, N. J.

Dear Editor:

Congratulations on your model airplane plans. I followed the plans and have won two contests already. The Monocoupe flew 200 feet the first time and it wasn't all wound up.

Please bring on some more plans like the Monocoupe. I think all of the model builders will appreciate them very much.

Edward Costello.

Howard Johnson's 26-page letter of adventure as an underwater gold miner wins first prize this month. MM model builders come through with excellent work and an MM design wins two midget plane contests.

* * *

That fine reproduction of the liner Bremen was built by R. W. Dishong. Here's what he says about it:

Johnston, Pa.

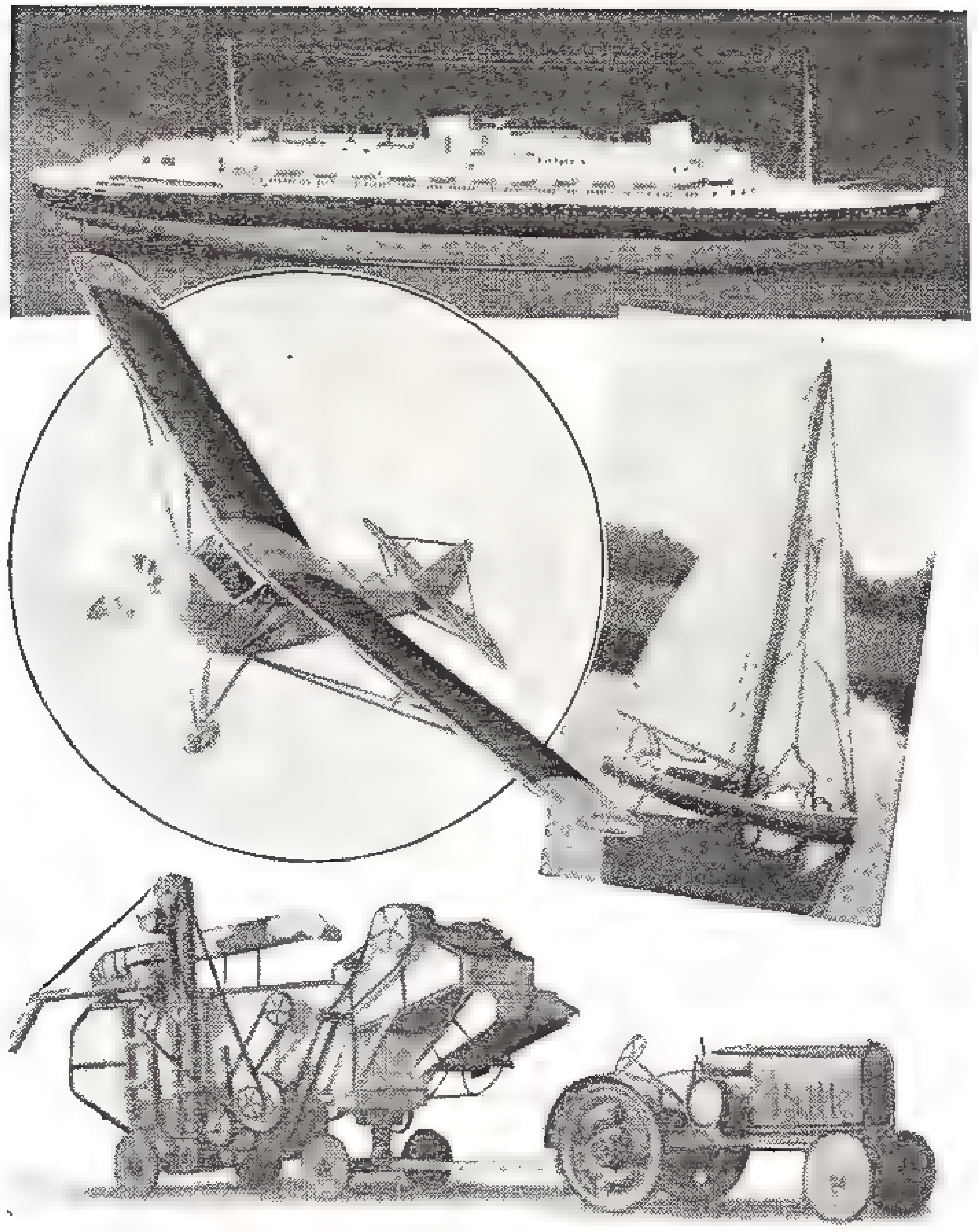
Dear Editor:

Enclosed I am sending a photo of a model I built of the Bremen. This model is 41 inches long, being built on a scale of one-twentieth of an inch. It is powered by an automobile horn motor and four flash light batteries. I procured the plans from the North German Lloyd Line and every part of it is built to scale. The model makes fairly good speed and looks like the real thing when under way.

R. W. Dishong.

* * *

What type of models do MM readers prefer? The field is unlimited; there are modern racing sail boats and liners, steam and electric type locomotives, gasoline or rubber powered airplanes, and historical models of all kinds. Just address a card to the Workbench and the biggest demand will be filled with how to build plans in MM as soon as possible.



The scale model Monocoupe plane won two contests for Edward Costello. It also brought him second prize of $3.00 in the Workbench contest. The fine scale model of the liner Bremen (at top), built by R. W. Dishong, is powered with an auto horn motor. George Cooper built the 18-inch sailing model, while Otto Tandberg built the model threshing machine and tractor.

Here, for instance, is Otto Tandberg who goes in for models of farm machinery.

Dear Editor: Leeds, N. D.

I am sending you a couple of pictures of some of the models I have made. I have seen many pictures of models of trains, boats, and airplanes, but none of tractors or threshing machines.

Otto Tandberg.

* * *

We had space for only one picture of George Cooper's racing sail boats, but here is his letter about them:

Dear Editor: Waltham, Mass.

Here are some pictures of two boats I built.

[Continued on page 20]

100 Locomotive-POWER PULLS the NORMANDIE

by L. J. MARKUS

The *Normandie*, largest ship in the world, is here being towed to drydock for a final overhaul and attachment of propellers. Note the curved bridge with wings.

ACROSS the Atlantic at express train speed plows the *Normandie*, newly-completed French Line ocean liner, to make a June third appointment at pier 88, gigantic terminal built especially for this queen of the seas at the foot of West 48th Street in New York City.

The *Normandie's* speed of 30 knots is equivalent to almost 35 miles an hour, the speed of the average passenger train. Four monster electric motors develop a total of 160,000 horsepower, equivalent to the combined pulling power of one hundred locomotives. This 1,029-foot ship, the largest in the world, will be able to make the trans-Atlantic crossing in less than five days, even in the stormiest weather.

On the maiden voyage between Havre and New York, the public will be permitted to inspect this magnificent floating city. Then will come regular twice-monthly round trips on a speed schedule never before achieved between the United States and Europe.

Literally a floating electric power plant, the *Normandie* is able to produce enough electricity to supply the entire lighting and power demands of a city the size of Boston. If the output of this power plant were used for other purposes than propulsion of the ship, it would light 5,000,000 ordinary household light bulbs, operate more than 3,000 street cars, supply more than 140,000 first class radio stations, or even, by pumping water continually for a year, lower the level of Lake Michigan ten feet.

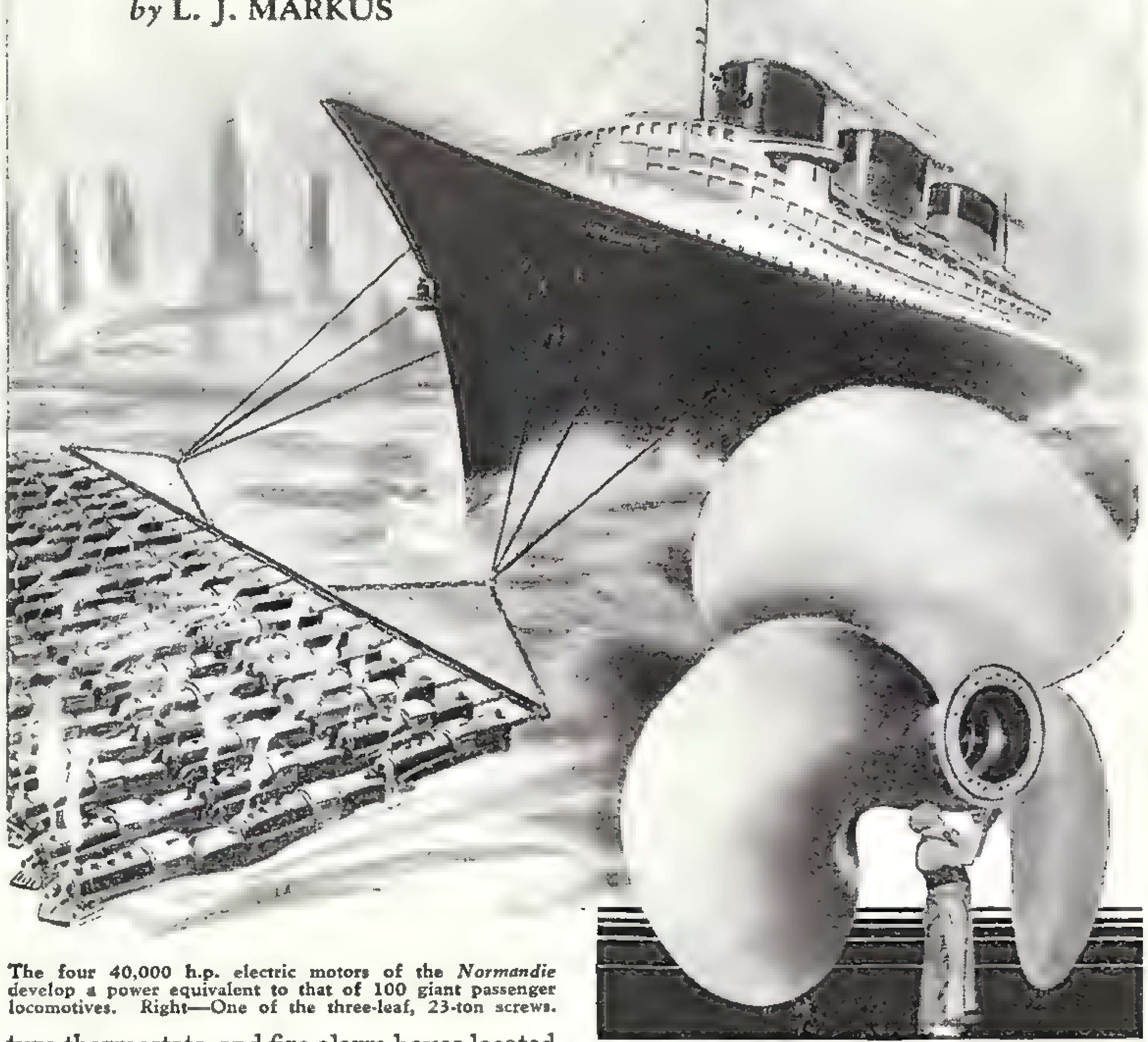
The four largest motors ever built, developing 40,000 h. p. each, are mounted directly on the shafts of the four three-leaf, 23-ton screws which will propel the boat.

Completely loaded, the giant liner will displace almost 80,000 tons of sea water. The hull itself weighing about 30,000 tons, required many forgings weighing up to 74 tons each. High-strength steel was used at the vital parts to give the required rigidity with less bulk.

So complete and varied are the facilities awaiting passengers on board the *Normandie* that it would be perfectly possible to spend a lifetime on the water. Medical care, amusements, and sports, as well as food and shelter, are amply provided.

More nearly fireproof than any other ship afloat, the *Normandie* has no fire-detecting or fighting apparatus on the bridge. Instead, a fire department with a staff of twenty-four professional firemen is maintained in the center of the ship, ready to respond to calls from any part of the two-block long vessel.

Smoke-detecting devices, excess-temperature thermostats, and fire alarm boxes located throughout the ship are connected to indicating switchboards in the central headquarters. Another board registers the locations at all times of firemen making regular rounds of inspection of the ship. These men must report every twenty minutes.



The four 40,000 h.p. electric motors of the *Normandie* develop a power equivalent to that of 100 giant passenger locomotives. Right—One of the three-leaf, 23-ton screws.

Although complete chemical fire fighting equipment is at hand ready for instant use, the Security Officer and his trained men carry out the highly specialized work of combating fires even before the disastrous flames can get a start.

Walls of all cabins are made up of a sheet of duralumin between layers of an asbestos material which is covered with fireproof paint.

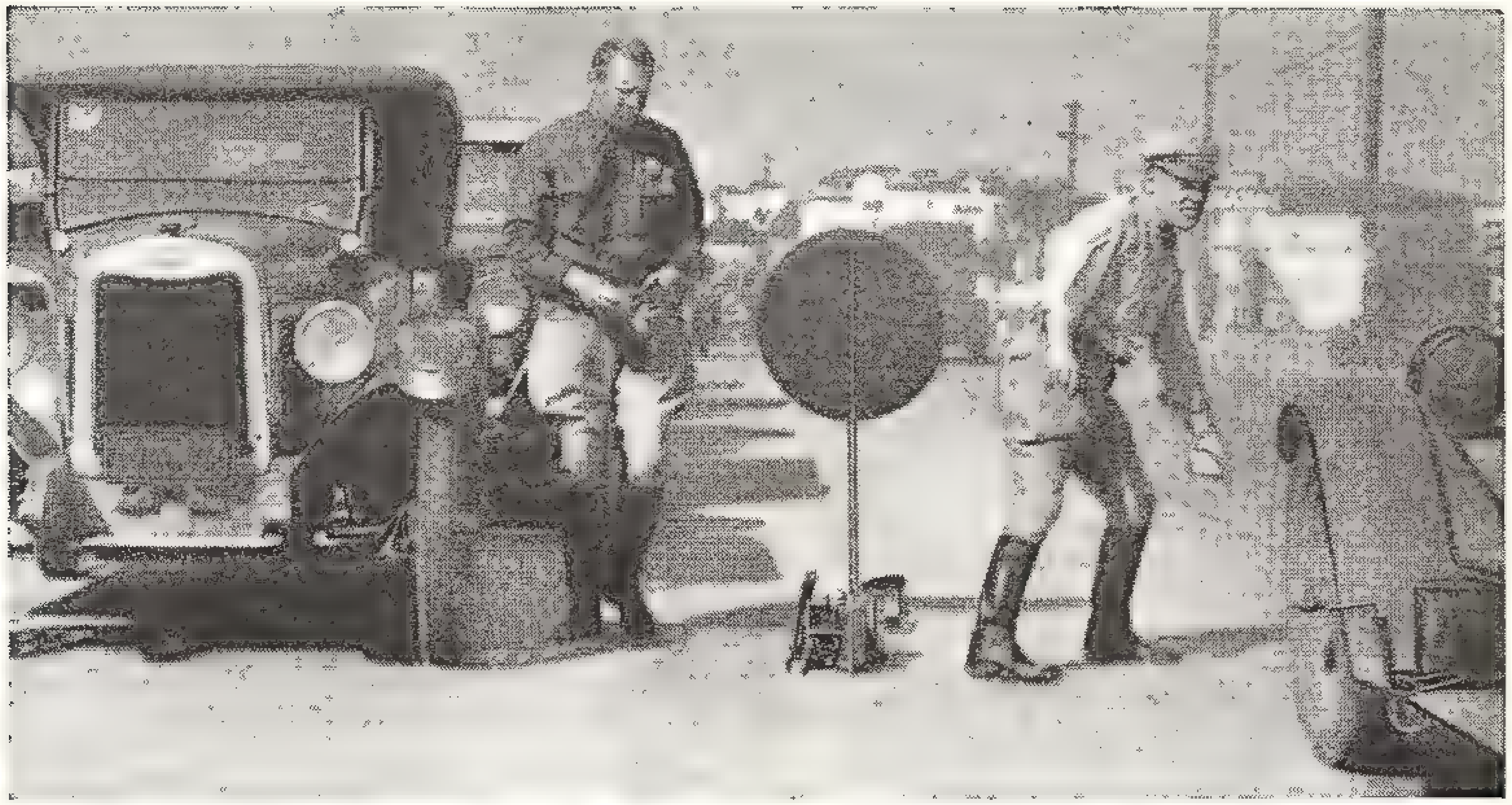
The sounding of a fire alarm will automatically close all ventilators in the section of the ship involved, eliminating fire-feeding drafts. Any one room can be completely flooded by inserting a hose line through an emergency hole in the ceiling, by means of a device invented by Captain Rene Pugnet, the *Normandie's* commander.

Phosphorescent signs throughout the ship will point the way to the life boats even though all the ship's lights fail.

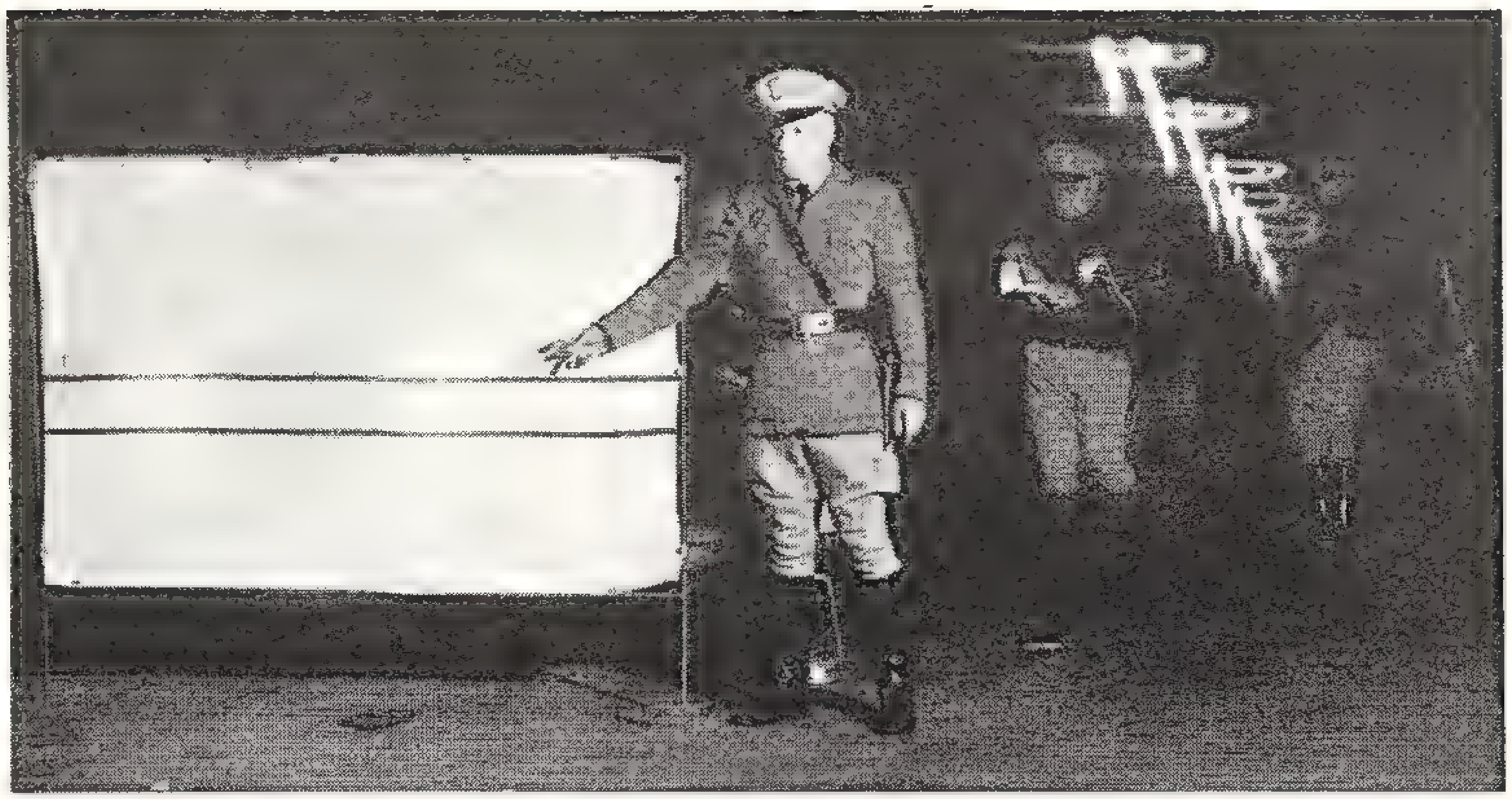
The largest ocean dining room in the world, 300 feet long and three stories high, will always be at the same comfortable temperature, even though it is entirely "inside," with not a window or skylight. Latest American air-conditioning equipment will manufacture its artificial weather. Not a single electric bulb

[*Continued on page* 145]

POLICE Declare WAR On KILLER CARS!



Seeking killer cars, California Highway Patrol officers stop all autos suspected to be in bad condition, and immediately test brakes. A brake testing box is clamped to the running board, the car is speeded up, and then stopped suddenly at the officer's command. Impact of sudden stop swings pendulum inside box, meter showing stopping distance from 20 m.p.h. speed.



Captain Stevens of the California Highway Patrol points out a headlight test chart used in war on killer cars. Autos are stopped a definite distance ahead of chart; those whose headlight beams go above upper black line get tickets. More than 1,000 cars ordinarily pass through such a test trap in one shift. Unless defects in lights are corrected at once, fines are imposed.

by MAXWELL REID GRANT

WAR has been declared on killer cars!

As an unprecedented wave of auto deaths stains the nation's highways, the chief traffic arteries of the country are being turned into a huge open-road laboratory, where a host of new schemes are being tried out. Police are invoking science to learn what makes accidents and how to prevent them.

The latest developments range from radio "courts of the air" and sensational movies of actual crashes, to resilient highway fences that absorb the impact of careening cars, and sodium-vapor lamps that create artificial daylight for night driving.

Mechanical brains play a large part by "thinking out" the causes of accidents as revealed by statistics. Their findings have debunked many pet theories, have set up these startling new facts:

Mist and rain do not increase, but actually reduce hazard. Fewest accidents occur in the worst weather; drivers instinctively fear skidding and drive with more care on wet pavement.

Fast driving in city traffic does not save time. A car going thirty miles an hour across town gets there just as soon as one going forty-five or fifty. Your car's brakes must be—and are three or four times as powerful as its engine.

Chief Davis of the Los Angeles Police Department says that the automobile is one of the modern world's worst killers.

"Auto deaths," he states, "now outnumber homicides three-to-one; suicides, two-to-one. Each year we actually spend a half billion dollars more for accidents than for new cars. Economic loss through auto crashes is four times the national fire loss. Statistics show that more than half—perhaps 90%—of these accidents are caused by a small group of irresponsible drivers numbering only 7% of the population.

The odds this year are 1 to 100 that you will be involved in an auto accident. Your chances of being killed in an accident are 1 in 3,500. This means that, within the next five years, some one of a group of twenty of your close friends will be killed or injured in a motor vehicle accident.

To save the 40,000 lives which in 1935 will be needlessly sacrificed if the rising trend of auto deaths continues, traffic authorities throughout the country are declaring war on killer cars and killer drivers.

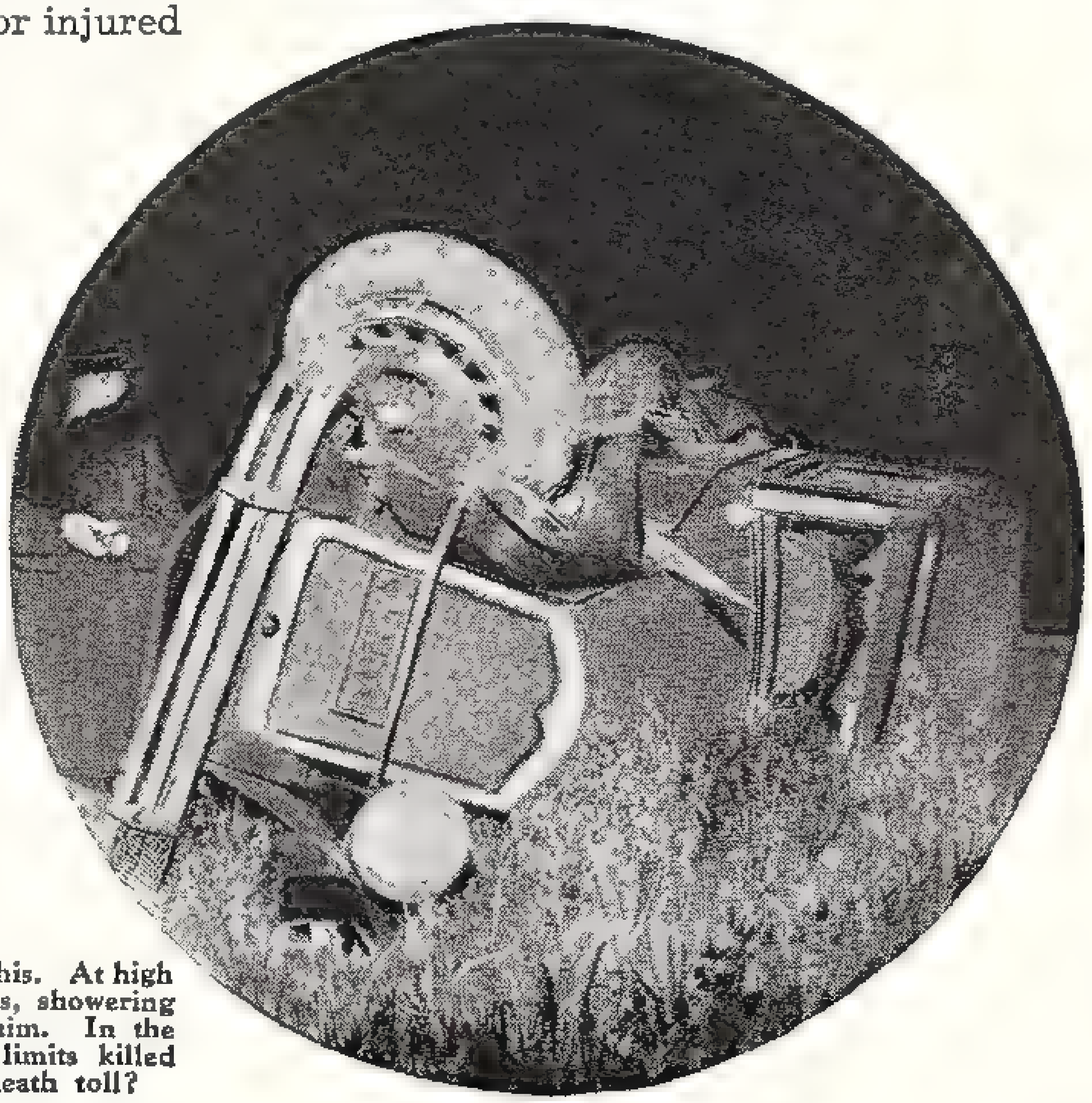
To test the results of "unrestricted speed," motorists on a wide California boulevard were allowed to "step on it" to their hearts' content. In just two days, speeds became so excessive that it was almost impossible for a pedestrian to cross. Accidents, injuries, and deaths piled up overnight and the experiment had to be stopped before it was fairly started.

A sharp increase in traffic deaths on the busy Bay Shore Highway near San Francisco, prompted another drastic experiment. Night and day, motorcycle officers patrolled this boulevard, under orders from Highway Patrol Chief E. Raymond Cato to stop all

[Continued on page 125]

DEATH TOLL OF 1934 KILLER CARS

HOW DEATH CAME:	No. Killed
Pedestrians hit	15,950
Stationary object collisions	8,850
Collisions between autos	8,570
Collisions with other vehicles	2,630
1934 Killer Car Death Toll	36,000
Collisions involving personal injury	882,000
Persons injured—nearly	1,000,000
AUTO DRIVERS KILLED 22,100 BY:	
Exceeding speed limit	6,850
Being on wrong side of road	3,470
Contesting right of way	2,740
Driving off road	3,820
Driving recklessly	2,740
Passing cars and cutting in	1,180
Miscellaneous causes	1,300
Fatal Accidents Due to Drivers	22,100



Killer cars and killer drivers make accidents like this. At high speeds, autos bounce and roll like rubber balls, showering splinters of glass and metal which kill and maim. In the United States alone, drivers exceeding speed limits killed 6,850 in 1934. What will be the 1935 death toll?

Grappling With Death
UNDER THE SEA

by WILLIAM REED

Holder of World's Record Undersea Dive, as told to Charles W. Geiger

"The swirling tide made a plaything of my safety rope. It entangled. When I was ready to ascend to the surface, I was caught. Making a quick decision, I cut the safety rope. Only the rubber hose supplying me with air was left by which to pull me to the surface. A weak spot in the hose, a jerk of the tide, a split in the rubber, and the water would have filled my diving suit." This is just one of the thrilling episodes in this story of adventure beneath the sea.

C. H. Purcell, chief engineer of the San Francisco-Oakland Bay Bridge, wishes Bill Reed a safe dive as he descends the ladder of the "Active" into the sea to examine the foundations of the bridge project. Diver Reed used bare hands and a metal rod to examine the concrete.

Here is William Reed, the champion diver, who tells of his harrowing experiences beneath the sea in the accompanying story. The composition helmet shown contains earphones. The metal head piece is fastened to the collar of the suit. Note the heavy safety rope which Reed had to cut when it entangled.

IT IS a far cry from the old diving days of manually operated air-pump and the jerked-cord signals to the modern air compressor and the portable telephone used by divers of today, but the romance and danger of diving remain.

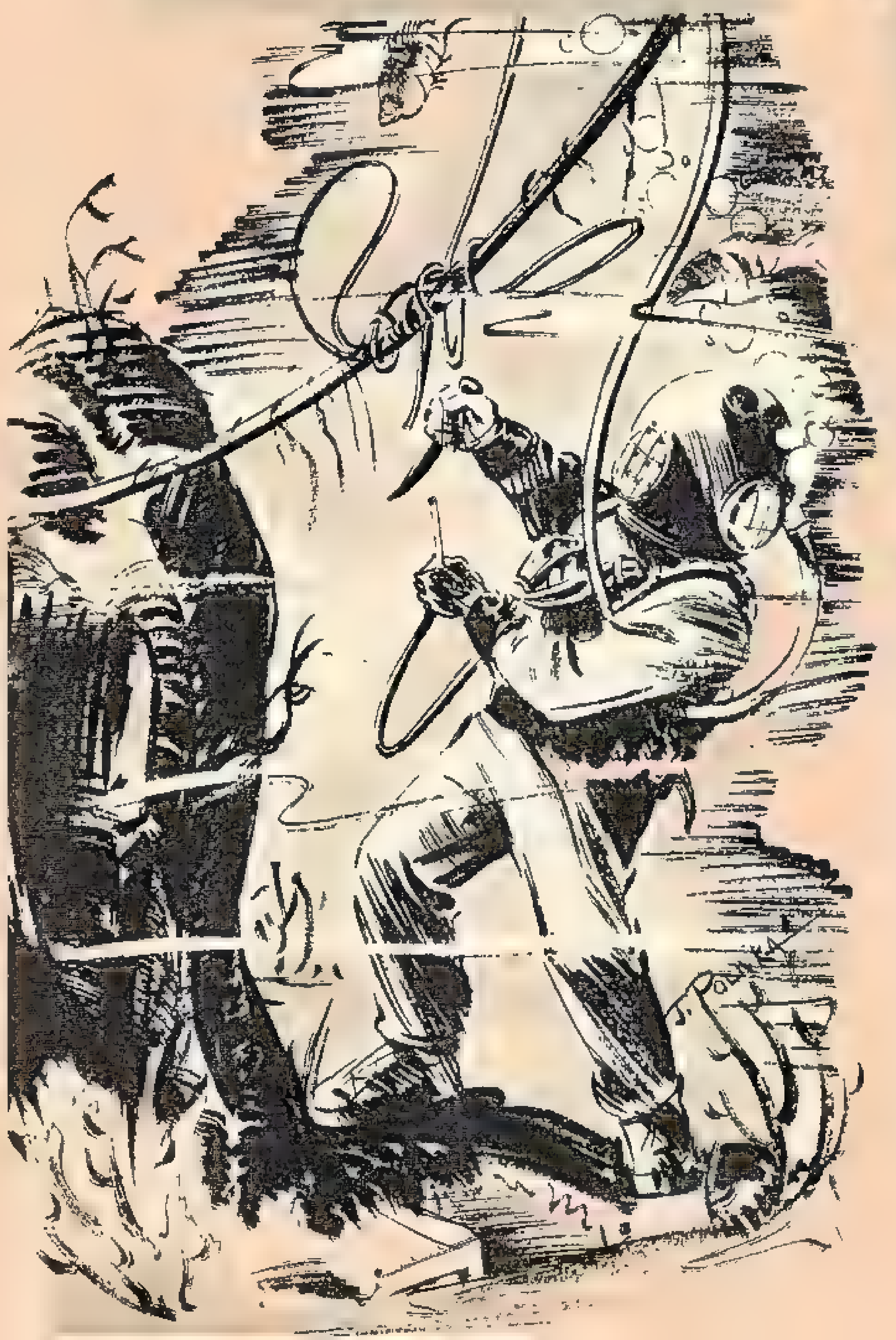
I have been engaged in deep sea diving for the past 28 years and during that time I have had some mighty close calls with death.

You get so you accept what happens below surface as a matter of course, but I had my worst experience when, while working at a depth of 150 feet, my air line parted. It was on the Southern Pacific Bridge job. I had been down for some time inspecting a caisson when I realized that my air flow had ceased. By shutting the emergency valve instantly I knew I could conserve what air was in the dress. That would last only a period of seconds before turning to carbon dioxide, a gas that will not sustain life.

It takes time to bring a man up from the depth working with utmost haste. The crew above knew what had happened and they were doing their best. It was a harrowing two minutes before I saw the light at the top. I didn't feel any ill effects till the next morning. When I awakened, I realized the sight of one eye was gone. The doctor said the extreme pressure had severed the nerve. Perhaps that helps to account for the fact that compensation insurance rated on divers is the highest in the world.

People ask me about thrills, adventures, narrow escapes, and all that. Well, after you've been doing something 28 years, it's really much of a routine thing. People seem to think that the life of a deep water diver is just a series of battles with man-eating sharks and devil fish, or searches through old wrecks for sunken gold. It isn't much like that.

It is mostly grubbing around in the mud at the bottoms of rivers and harbors, inspecting pier foundations, fishing for broken cables, seeing if old hulls are worth raising.



One moment there is the queer figure of a diver on his ladder with his steel shod shoes and his helmet and breastplate of steel. The next there is just a hissing and gurgling of air and a trail of bubbles from the sea depths to mark where the human being is laboring in mud and slime of the ocean floor. But romance and danger of diving remain. Many people ask me what I think about when I'm being lowered into the depths of the water. Of course, the only thing I think about is the job I'm going to do when I get down to the bottom. No, the thought of danger never enters my mind. I'm just as apt to get hurt crossing Market street in San Francisco (and probably more apt to) than when I am walking along the floor of San Francisco Bay.

The main idea in diving is to see that your apparatus is in apple-pie order, then to go down quick, keep your head while you are down, and come up slow after you have

Secrets of the Man On The FLYING TRAPEZE

In this twisting somersault, originated by Arbaugh, he is just starting to bend down for the forward somersault to bar in hands of catcher at the right

by **JAMES ARBAUGH**

as told to Annie Dyer Nunn

Editor's Note: Today, after 27 years of life under the big top, James Arbaugh is considered one of the world's greatest artists of the flying trapeze. Hard work and cheering circus crowds are his life and happiness; read this story, told in his own words, of the thrills and dangers that await an aerial acrobat.

SELLS FLOTO circus was in full swing, and the Coliseum in Chicago was filled to capacity. All eyes were trained on the Flying Wards. I was one of them, nine performers skimming through the air nearly a hundred feet above the sawdust ring. In doing a double cut away to my wife, I was to catch to a bar in her hands, as she swung head downward to meet me. She was an instant too quick and hooked me under the knees! I just missed her face with my flying feet. I rode the swing to the end where I changed from my hocks to my hands and finished the act as usual.

The house roared. Apparently, we had done an extremely clever trick. No one guessed that the stunt was unheard of, or that I had barely escaped a terrific fall and Mrs. Arbaugh a facial injury.

Because you've never seen a trapeze actor fall, don't imagine we are immune. We have plenty of falls and our minor injuries are legion. I've seen leapers get their teeth knocked out by flying bars, and have had the arteries in my arms, and in those of my catcher, burst from the impact when I came out of a full double twister. But, comparatively speaking, our actual crack-ups are few. I have had four, the worst being in Minneapolis when I got a shoulder so badly dislocated it required the combined strength of four men to pull it back in place.

In this connection, a comparison of the records of Alfreda Cordona and Ernest Clarke, among the greatest of trapeze performers today, is interesting. Clarke has never had a serious accident in his life; while Cordona has had several, and even now is training to come back after a frightful shoulder injury received a year ago when doing a triple somersault. Perhaps he is a bit more reckless than Clarke, who prides himself on never taking any unnecessary risks.

Cordona did not use a mechanic when learning the triple somersault; it was in his way, he said. A mechanic is a heavy leather belt about the waist of the performer, attached to ropes suspended from the ceiling of the gymnasium. A person on the ground watches the contraption and keeps the performer from falling by taking up the slack in the ropes. Of course, this is used only in practice work.

On the other hand, Clarke favors a me-

[*Continued on page* 144]

A DICTIONARY OF THE FLYING TRAPEZE

CASTING—Losing control of mind and body for a short or long interval while whirling through the air.

CATCHER—A performer who hangs from a trapeze, catching acrobats who fling themselves through space.

DOUBLE CUTAWAY—A backward somersault to a bar in the hands of the catcher.

DOUBLE TWISTER—A difficult trapeze trick including a pirouette and a somersault.

FULL DOUBLE TWISTER—Two somersaults and a pirouette.

HOCKS—The legs of aerial acrobats.

MECHANIC—A safety belt with rope, used to prevent falls when practicing new trapeze stunts.

NET—A strong but resilient cord netting stretched about six feet above the floor, directly under the trapezes.

PIROUETTE—A whirl in perpendicular fashion from left to right, in the air.

T BAR—A small trapeze inside a larger one.

TRAPEZE—A short horizontal bar suspended from rigging by two parallel ropes.

TRIPLE SOMERSAULT—Three head over heel spins through the air.

A split-second error in timing means a fall and possibly serious injuries, despite the net, in aerial acts like this.

Left to right: Irma Ward, America's premier aerialist, James Arbaugh—author of this article and his wife, Jessie Arbaugh, who sometimes acts as his catcher.

CIRCUS ODDITIES

OVER 24 MILES of rope and cable are used in the aerial riggings of the Ringling & Barnum circus when in Madison Square Garden, New York City. Under the big top this figure increases to 41 miles. There are 60,000 feet of rope in the meshes and guy ropes of the nets alone.

THE "MAIN GUY" of a circus is not the boss, but a wire cable holding the center poles in place.

JENNIE ROONEY, with a star double trapeze act to her credit, gets dizzy when she looks out of high windows. Elevators frighten her!

HELEN WALLENDA, member of the Wallenda act performing breathtaking stunts on the high wire, fainted when she first saw a newsreel showing of her act.

A TRAPEZE BAR BREAKS each time Mlle. Gillette, a newcomer to the American circus world, goes through her act! Poised 60 feet above the sawdust ring, with no nets below, she dives headlong for a trapeze fifteen feet away. The bar splinters, down and down she tumbles, to be caught in the nick of time, a few feet above the ground, by a pair of wires.

MALTESE CROSS RIGGING is used by Papa Otari and his family of aerial acrobats. Trapezes are arranged along the bars of the cross, rather than in one line. Performers work in two directions, whizzing past each other in mid-air. A collision or even a slight touch might mean disaster.

A TROUPE MANAGER pays his performers according to what he thinks they are worth. Though Alfredo Cordona could get dozens of good catchers for $75 a week, he paid his brother Lalo $125.

CATCHING 200 CUES for that many different numbers, the Merle Evans band plays continuously for three hours at each Ringling & Barnum performance.

A POLICE DEPARTMENT is carried along by every big circus. John Brice, chief of the Ringling police force, knows more American chiefs of police than anyone else.

CLOWNS COPYRIGHT their faces. Once a clown appears in the ring with a new facial make-up he has developed, no other clown will copy it. Felix Adler, most famous of the "Joeys", has a red electric light at the end of his apple-like nose.

DEBUNKING *Poison Gas* WAR SCARES

by CAPTAIN GEORGE J. B. FISHER,
Chemical Warfare Service, U. S. Army,
as told to James Nevin Miller

Europe is preparing for war. Her people are being drilled to use gas masks and to fight poison gas air raids. Will deadly gas wipe out American cities, destroy U. S. armies? Here are an expert's views on this "bogey man" of war.

Blindgänger!!
Lebensgefahr!

ENORMOUS cities blanketed with death-dealing gas fumes. Citizens rushing about in panic as enemy planes roar overhead. Thousands of lives snuffed out in a few minutes. Countless humans coughing and screaming with fear, fighting among themselves to reach subterranean gas-proof cellars.

This is the terrifying picture so frequently painted by fiction writers, the movies, and the sensational press about the horrors of poison gas in the next war.

But is the picture a true one? Is there any basis in fact for it? No, says the Chemical Warfare Service of the United States Army. After more than twenty years experimentation with every kind of poison gas known to science, the nation's acknowledged authority on the subject has come to the conclusion that gas is the "bogey man" of war.

Uncle Sam's chemists, convinced that the public has a right to know the real facts, even go so far as to say that as much as 12,000 tons of mustard gas, most devastating of all war time gases, could not possibly wipe out a big city's population. Not once in history has an aerial gas attack ever been launched against a city. While this method undoubtedly will be tried in the next war, such an attempted slaughter of defenseless millions actually is no more and no less than a fantastic dream.

Even in the World War, with hundreds of thousands soldiers massed in open fields, apparently perfect targets for aerial gas attacks, this method was not as destructive as other weapons of war. To prove this conclusively to the skeptical-minded, the Chemical Warfare Service cites these facts and figures. As little as 20 milligrams of mustard gas absorbed into the lungs will cause death. At first glance it would seem, therefore, that 12,000 tons of this chemical could wipe out a third of the population of the United States. However, this quantity of mustard gas was actually used during the World War. True it incapacitated 350,000 men. But only 2.5 per cent of them died. Thus

GAS IS EFFECTIVE WEAPON SAYS EUROPEAN EXPERT

Although he admits that poison gas is the least destructive weapon in modern warfare, Dr. Herbert Levinstein, one of the leading poison gas experts on the Allied side during the war, declares it is one of the most effective weapons for incapacitating enemy troops and throwing civilians into panic.

He claims that gas has not made war more dangerous because only a small percentage of gas casualties result in death.

"It has introduced fresh possibilities of effecting a strategic surprise which is quite different," he said. "Far more destruction of property, greater mortality and suffering are caused by dropping high explosive or incendiary bombs from aircraft than by using gas-filled bombs or shells."

He added that gas probably would be more effective, however, because it caused panic among uninstructed, unprotected civilians.

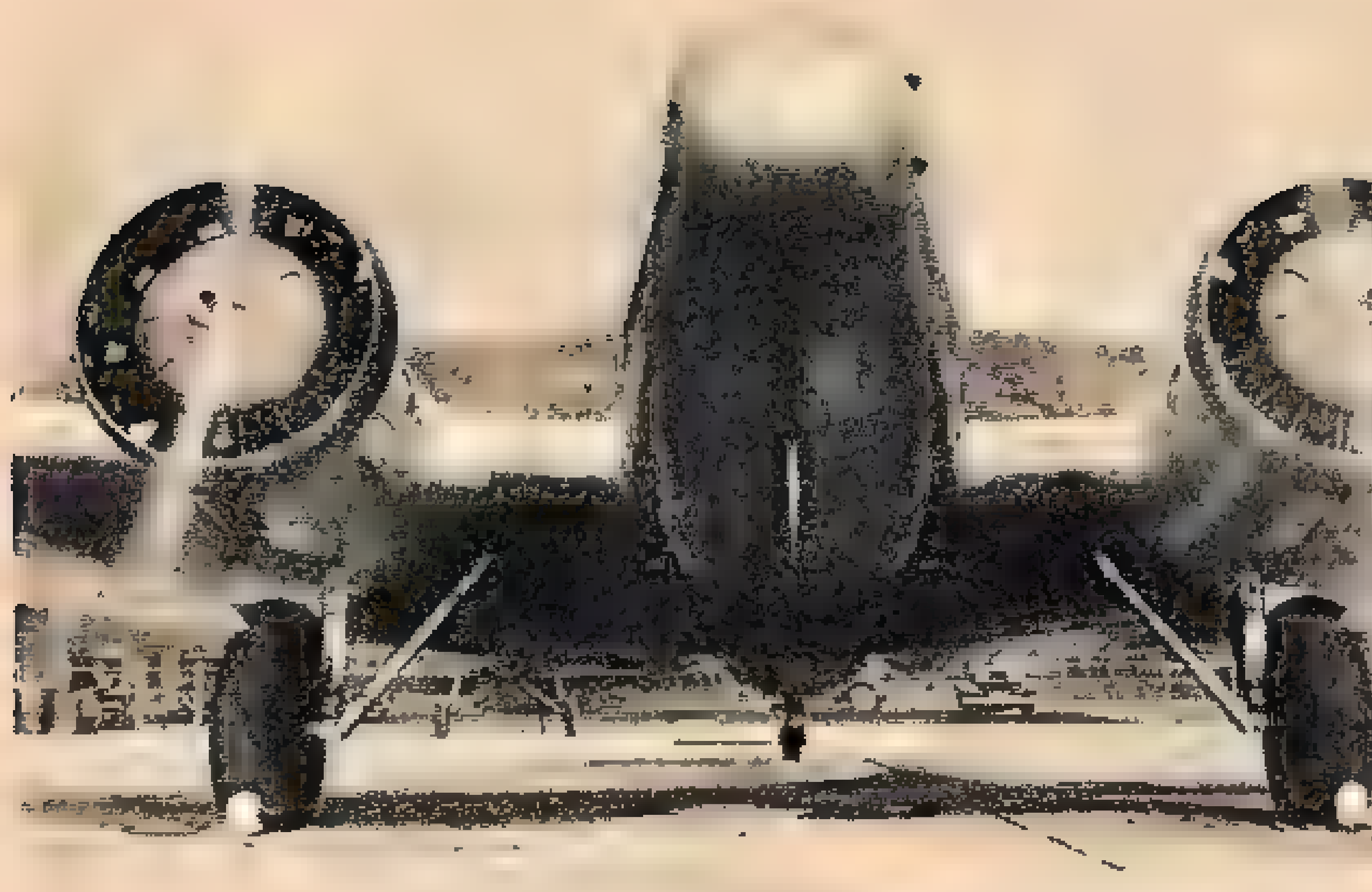
During mimic bomb and gas attack on Berlin, German soldiers set up signs warning citizens their lives were in danger. City was plunged in darkness, civilians hid in cellars during raid.

Above—Berlin street cleaners, attired in gas masks, counteract effects of poison gas by washing streets with special preparation following mimic air raid. Left—Transportable shelter developed by France to save civilians during gas attacks. During raids, rescue workers set up shelters, find overcome citizens, and revive them in the shelter which holds 5 persons.

Smoke screens laid over a city by planes will make it difficult for enemy air raiders to launch bomb and gas attack. To drop gas raiding planes must fly low, making them vulnerable to anti-aircraft fire. No gas raids were attempted during the World War.

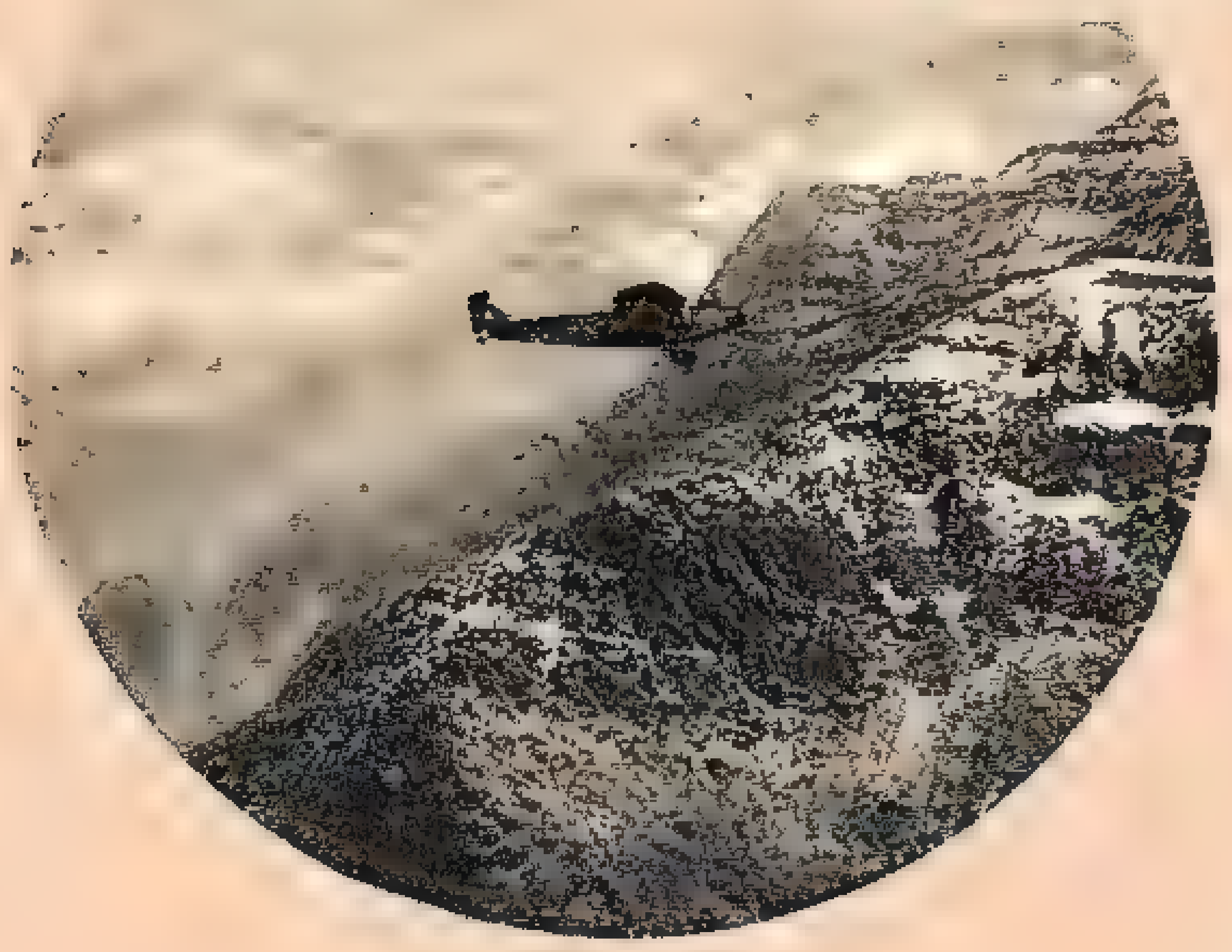
Who Will Win HISTORY'S GREATEST Air RACE?

In this exclusive interview the President's son tells of his plans for a $100,000 speed classic around the Americas.



Will the brute power of some monster transport win $50,000? This is a new United Air Lines transport.

Elliott Roosevelt, son of the President, announces the greatest international air contest in history—a free-for-all race around North and South America for the world's crack speed pilots.



Roughest hop on 20,000 mile air race course is this, the Andes crossing between Buenos Aires and Santiago. A minimum altitude of 18,000 feet must be maintained for 110 miles. Photo shows a Pan-American Airways plane above the Andes, where treacherous air currents ever threaten.

by JAMES DYSON

A GIGANTIC "Around the Americas" air race, with practically every famous distance flyer in the world entered, is now being planned by 23-year-old Elliott Roosevelt, son of the President. October of this year or April, 1936 are the contemplated starting dates for this contest over the longest course in history, almost 20,000 miles, with prize money exceeding $100,000.

This race will be the most trying test of an airplane ever attempted, announces the National Aeronautic Association, official governing body for all American air records. All kinds of conditions will be met from extreme cold to extreme heat. An altitude of at least 18,000 feet will be encountered in crossing the Andes between Buenos Aires on the Atlantic and Santiago on the Pacific. Water jumps, deserts and jungles must be negotiated by the successful contender.

As Ray Cooper, general manager of the N. A. A. points out: "The longest water hop is about 700 miles. The roughest part of the trip is across the Andes from Mendoza to Santiago, but the distance is only 110 miles. If the course is maintained the pilot should be able to walk away from a forced landing in any other place, and with a reasonable supply of emergency rations should be able to exist until rescued."

Interviewed exclusively for MODERN MECHANIX AND INVENTIONS MAGAZINE in the historic Red Room of the White House, Elliott Roosevelt recently discussed the highlights of his plans as follows:

"Will I be able to swing the great international race? Without doubt a lot of veteran flyers are skeptical. But already I have raised most of the prize money and now have ample promises of adequate financing from responsible parties. Numerous rumors are being circulated to the effect that Edsel Ford is one of my biggest backers. As to that I am pledged to secrecy right now. Probably it will be many months before I will be able to offer even a partial list of those aiding the project.

"However, there is every evidence that it will become an actuality. Thus far I've received about 44 inquiries, most of them from leading aviation organizations of the great powers. These include the Aero clubs of France, Germany, the United Kingdom, Italy, Austria and Poland, besides the Aeronautical

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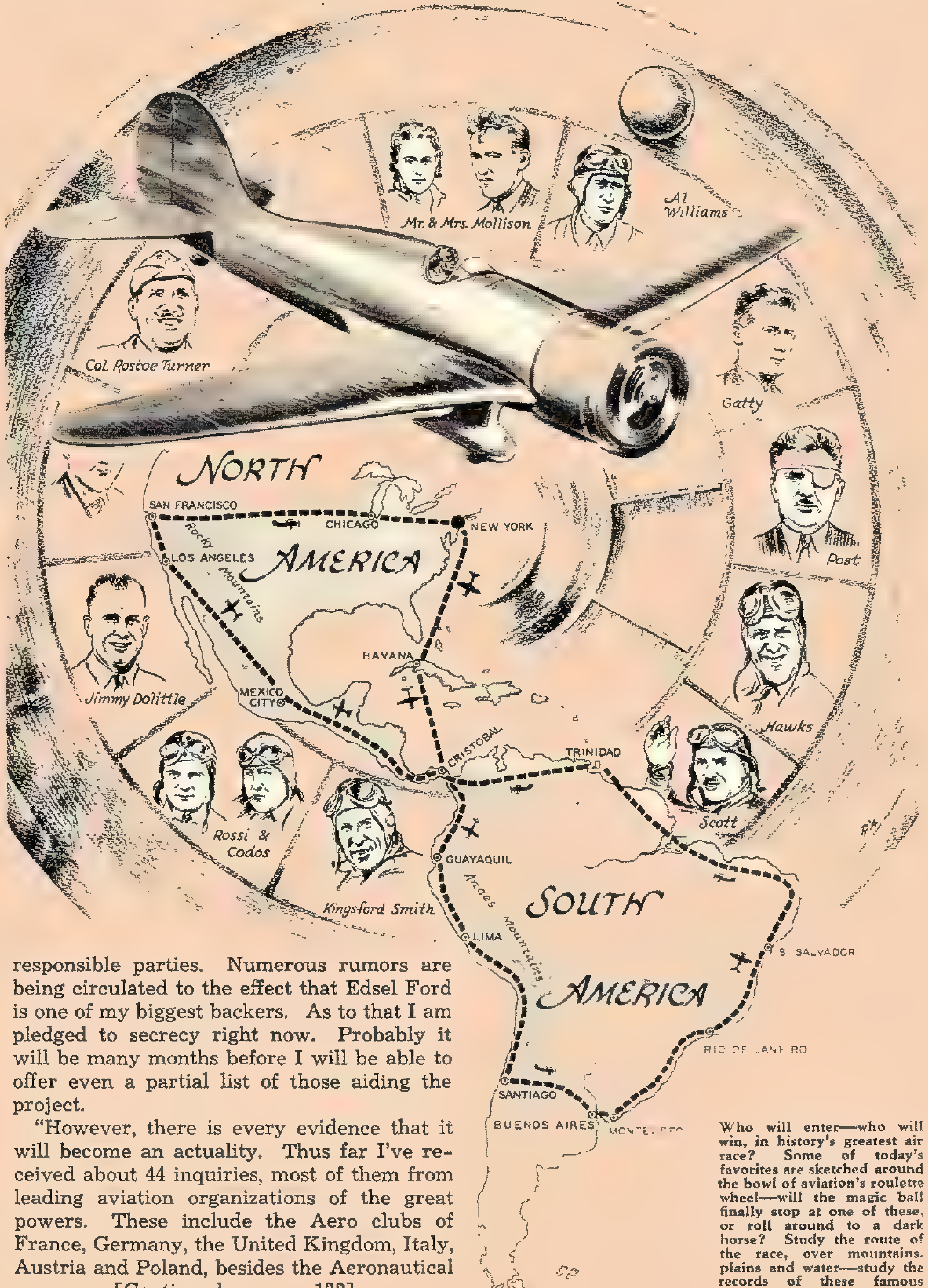

Who will enter—who will win, in history's greatest air race? Some of today's favorites are sketched around the bowl of aviation's roulette wheel—will the magic ball finally stop at one of these, or roll around to a dark horse? Study the route of the race, over mountains, plains and water—study the records of these famous aviators, pick your winner.

TEACH Your DOG THESE TRICKS

by EARL CRAIG

A famous dog trainer tells how to teach your dog to back up, shake hands, pray, act dead, carry articles, sneeze, waltz, and do a host of other interesting tricks.

Through the hoop, held shoulder high, leaps this well-trained dog. Make your dog jump over a horizontal bar first, then through a large hoop, reducing hoop size as he gains confidence. Later, paste tissue paper on hoops.

A few minutes of training each day will make your dog sit up or fetch articles at your command.

Dogs enjoy jumping over sticks once they are taught, by a few gentle raps on the nose, not to grab the stick or run under. Right: One of the more difficult stunts, but one which can be taught by patience, is waltzing while standing.

At the command "dead dog," the dog below lies down, feet in air, eyes closed. In teaching a dog to "roll over," push him around a few times yourself, while repeating command.

TRAINING your dog is not as difficult a task as some may assume. Patience, kindness and good care will bring rich rewards in the form of increased loyalty, prompt obedience to commands; and good manners.

Dogs are like humans when it comes to performing tricks they have thoroughly mastered. Their sense of pride is apparent when they are the center of attraction, the life of the party.

Perhaps the simplest of tricks is teaching a dog to shake hands. Place the dog in a sitting position. Standing directly in front of him, grasp the right paw gently, raise and shake it, saying "shake hands." A few minutes of this lesson daily for a day or two will make your dog eager to shake hands whenever he gets the chance.

Commands which are properly taught will always be obeyed. Show a rubber ball to him, then drop it on the floor, commanding "pick it up." This done, coax him to you, command "drop it," then repeat the trick.

After having learned to pick up a ball, the dog may be taught to hold it. Take his collar in your right hand and with the left, support his lower jaw, cautioning him all the time to "hold it." Reward him and repeat the lesson. When he becomes proficient in holding, tell him to "come, carry it," and start walking. Be sure he does not drop it. Do not make the distance too long to begin with.

The old saying, "practice makes perfect," was never truer than when applied to teaching the dog. A short training period, frequently and consistently given, is the best routine to follow.

Each year many dogs are accidentally and intentionally poisoned. Two methods are used in teaching the dog to ignore choice looking bones or meat left about in conspicuous places. First watch him closely. When you see him about to pick up something, say, "No, poison, drop," and enforce your command. It may be necessary to plant some bait at a point he frequently passes, but do not let him see you place the bait.

The second method is much more effective though not a pleasant one for the dog. Have your druggist prepare some bitter but harmless preparation for you. Tell him what you want to use it for. Pour it on some choice and tempting pieces of meat, and place them in different locations. Take the dog for a walk and casually pass your bait. When you see him pick it up, caution "poison," but say no more. Likely as not when your back is turned, he will gulp it down and follow you. Keep him outside, for aside from the bitter taste left in his mouth it is quite likely the preparation will make him sick. A little red pepper or other strong seasoning, concealed in meat, is also used by dog owners for this purpose. Usually, after one or two lessons, he will refuse to eat anything lying around the yard.

Dogs seem to acquire the knack of doing tricks in a very short time, once they have been taught control and prompt obedience

[*Continued on page* 135]

UNCLE SAM FIGHTS The BLACK BLIZZARDS

by JAMES NEVIN MILLER

LIKE a forest fire roaring out of control, a huge billowy cloud sweeps over the horizon. Growing larger and larger, it soon blots out the sun. Day turns into night. For miles around, the air is filled with stifling, blinding dust. Fine particles strike the face like millions of white-hot needles. The dust stabs at one's lungs.

Within an hour, the black blizzard has enveloped everything. Living becomes unbearable. Schools close their doors. Trains drop far behind schedule, their powerful headlights unable to pierce the black dust cloud. Discouraged farmers, fearful of dread "dust pneumonia," pack their belongings into wagons and move away. The dusty drifts cover fences and farm machinery and sweep over buildings.

Crops are destroyed. The valuable top soil is gone. For months, cattle will be unable to forage on the surrounding hillsides.

Do these black blizzards foreshadow the doom of the fertile United States? Dr. William Jackson Humphreys, of the United States weather bureau at Washington, recently predicted that by 7,000 A. D. the United States and most of Asia and Europe will become a desert due to lack of rainfall. Weather in the temperate zone is gradually becoming warmer. The time will come, Dr. Humphreys believes, when the populations of the world will be forced to flee to the tropics or polar regions to find sufficient rainfall to sustain life.

But Uncle Sam will not give up his valuable land without fighting. He has launched a terrific battle against one of Nature's most puzzling and devastating cataclysms. He is going to try to put an end to the black blizzard.

The new warfare is carried on from experiment stations located at strategic points in the dust storm areas.

According to experts, 125,000,000 acres of land now in cultivation—equivalent to the combined areas of Ohio, Illinois, Maryland and North Carolina—had lost all or a greater part of its top soil due to wind erosion.

In the Texas Panhandle many fields lost as much as three feet of soil and subsoil. In

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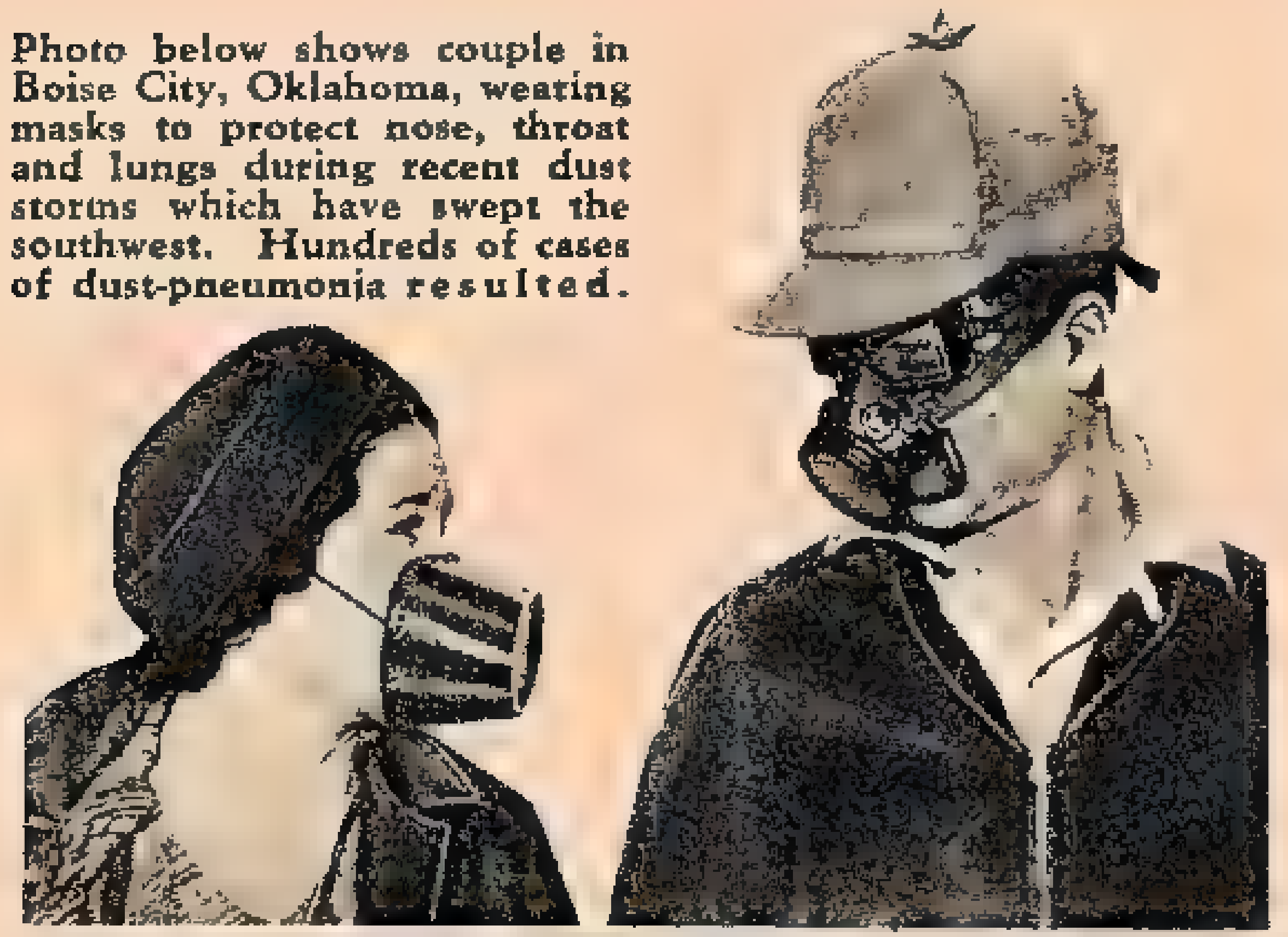
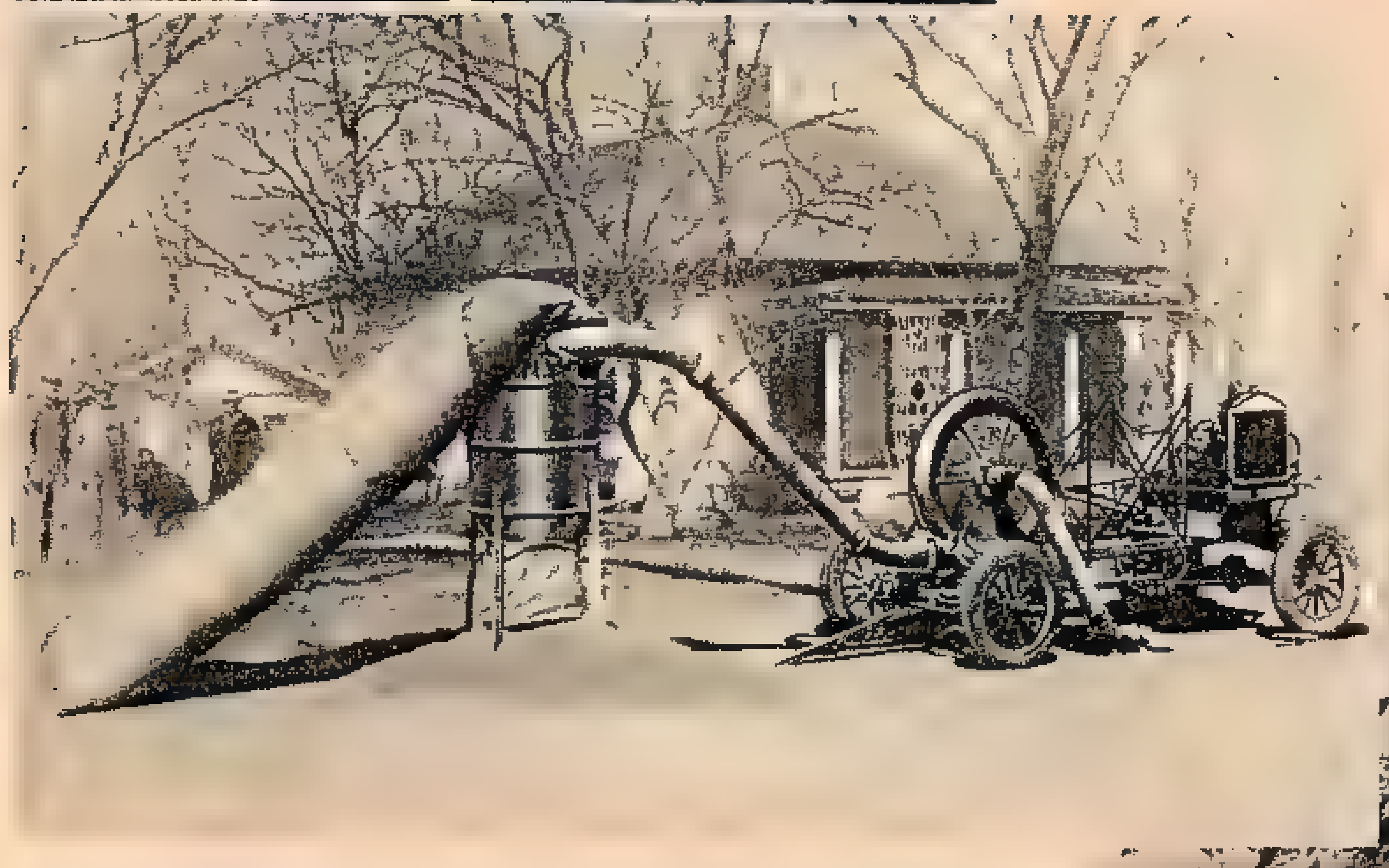
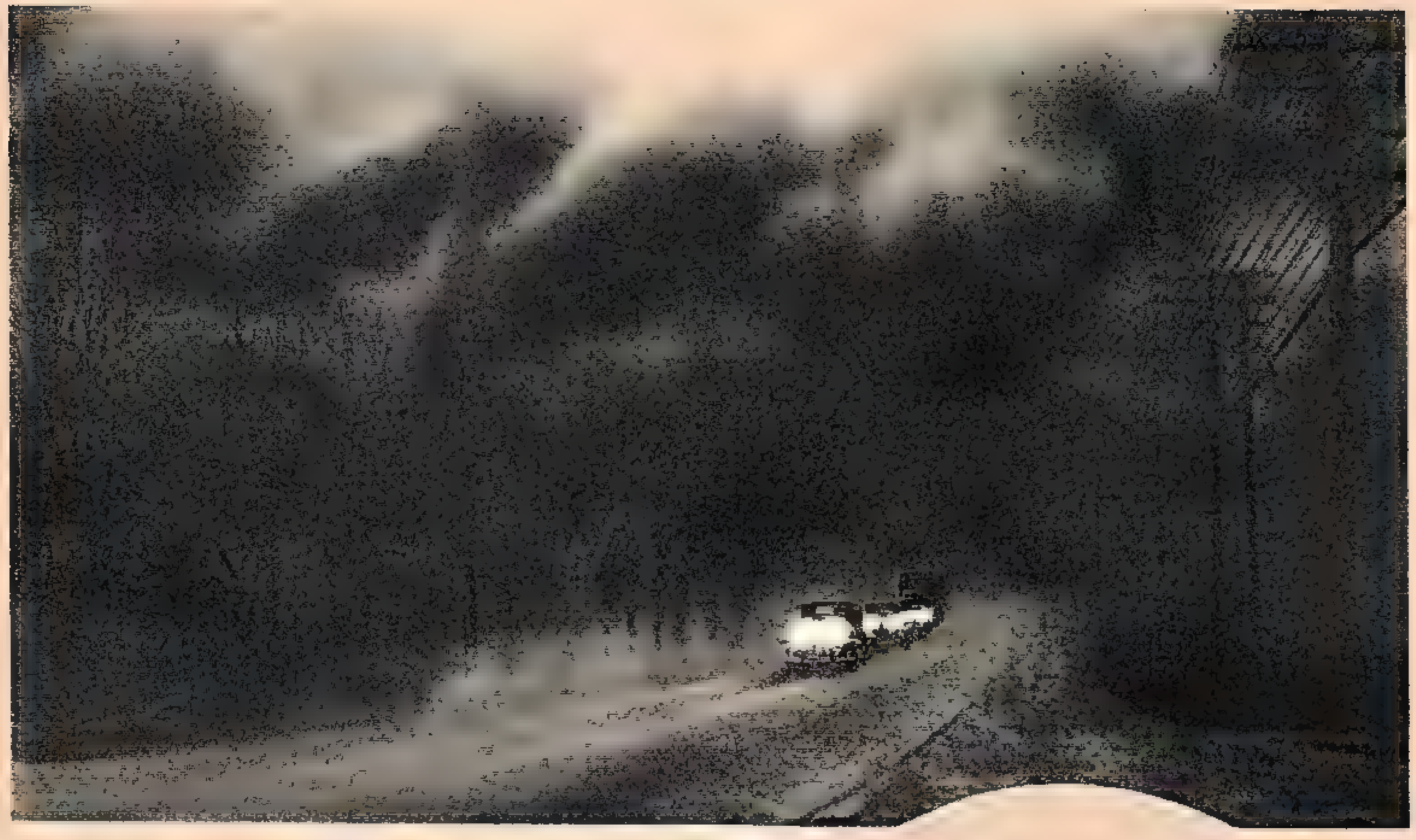
Photo below shows couple in Boise City, Oklahoma, wearing masks to protect nose, throat and lungs during recent dust storms which have swept the southwest. Hundreds of cases of dust-pneumonia resulted.





Dust settled so thickly on Kansas lawns that two mechanically-inclined men started a profitable business with the huge home-made outdoor vacuum cleaner shown above. Right—Typical scene along silt-covered road in the sand-swept Great Plains area.



Above—Motorists plunging through one of Missouri's black blizzards were compelled to use their headlights at high noon. Circle—Building a huge reservoir for supplying water to fertile fields. Other means of dust storm control are being tried by Uncle Sam's army of experts to conserve the valuable top soil.

SIDELIGHTS ON THE DUST STORMS

Dust blew with such force in Kansas that it completely packed ignition locks and parked cars could not be unlocked. Highway traffic, unable to plow through the roads, was suspended.

For the first time in history train schedules were canceled on one division of the Santa Fe Railroad.

One construction company had a contract to move 10,000 cubic yards of earth in a county road project. Workmen started loosening the ground when the storm struck. When it ended, the contractor found that the wind had done his work for him.

In Oklahoma, static electricity accompanying a dust storm was of sufficient strength to shock persons who touched metal. Human hair stood on end. In Missouri, telephone, telegraph and radio reception were hindered by the electrical charge. Even cars were stalled.

Right—Constructing level terraces to retain moisture is another method employed by soil erosion experts who are fighting the dust storm menace. In the Plains area, an average of 80 tons of topsoil per acre were lost to farmers. Kansas wheat-growers have given up all hopes for a forthcoming harvest. Many will not raise enough wheat to seed the next year's crops.

REVAMPED FURNACES COOL The Modern Home

On the trail of that mysterious "something" that makes mountain air so invigorating, engineers are developing "super-air" for new home comfort.

by PAUL DARROW PADDOCK

HUMAN beings are serving as guinea pigs in an eastern laboratory where a series of interesting experiments is under way to improve "man-made weather," to make furnaces cool as well as heat our homes, and to reproduce that "mysterious something" found only in mountain and seashore air.

Scientists are on the track of a clue that may lead to the development of "super-air," even better for human health and comfort than that found in nature. They believe the secret lies in the free ions or electrically charged particles that exist in natural air.

Well educated, normal persons are required for the "super-air" tests. Exposed for awhile to an unusual bombardment of positively charged ions, they become groggy. They cannot do such simple things as add columns of figures, scientists report.

The positive ions are switched off and negative ions turned on. In a little while, the "human guinea pigs" become buoyant. Their mental powers are stimulated. They add figures and do other things more quickly and more accurately than normally. These tests, pioneer experiments in man's fascinating and comparatively new field of science, *air-conditioning,* are as yet inconclusive, but indicate that some day an electrically treated air, rich in health-giving qualities, may be made available in every home and office building.

Most of man's energy comes from the air. Although an average adult consumes only three and one-half pounds of food and four pounds of water a day, he takes in more than thirty-four pounds of air in that same time.

Recent investigations indicate that cosmic rays may have a great deal to do with human comfort, through their effect on the air.

Normally, Dr. L. W. Chubb, director of research at Westinghouse Electric and Manufacturing Company points out, the air contains ozone, and is free from dust, fumes, and

[*Continued on page* 143]

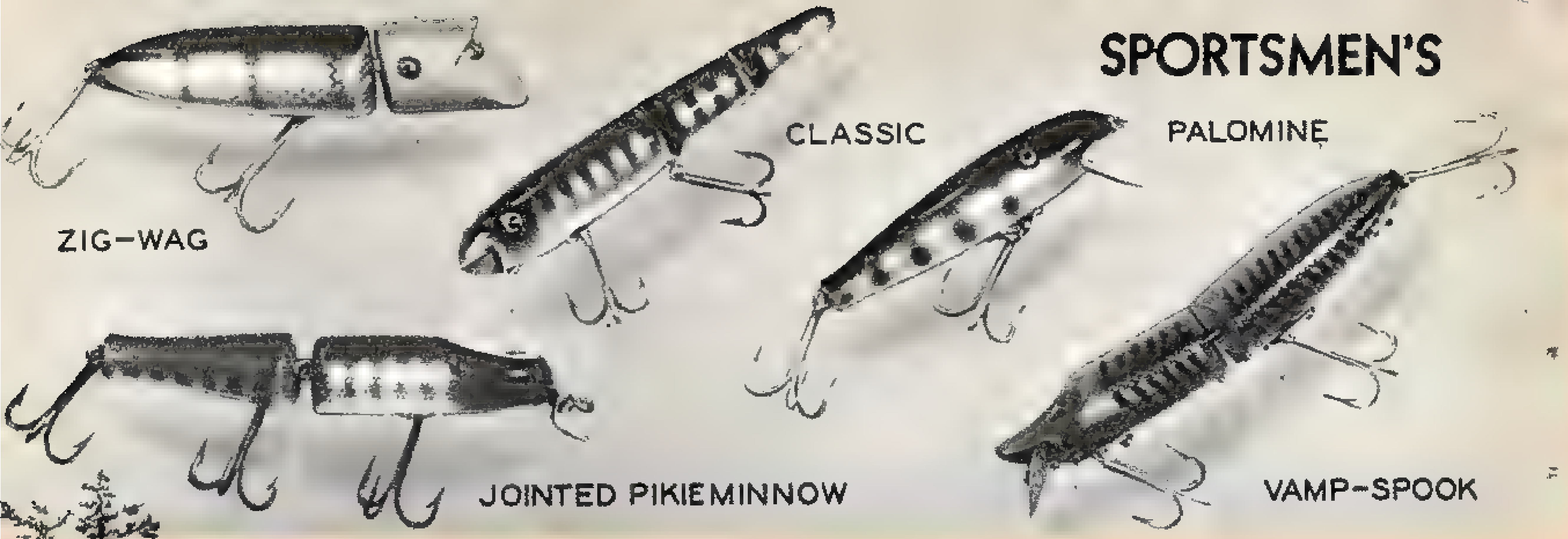
The modern furnace supplies cool washed air in summer, clean heat in winter. Above: Adjusting water valve.

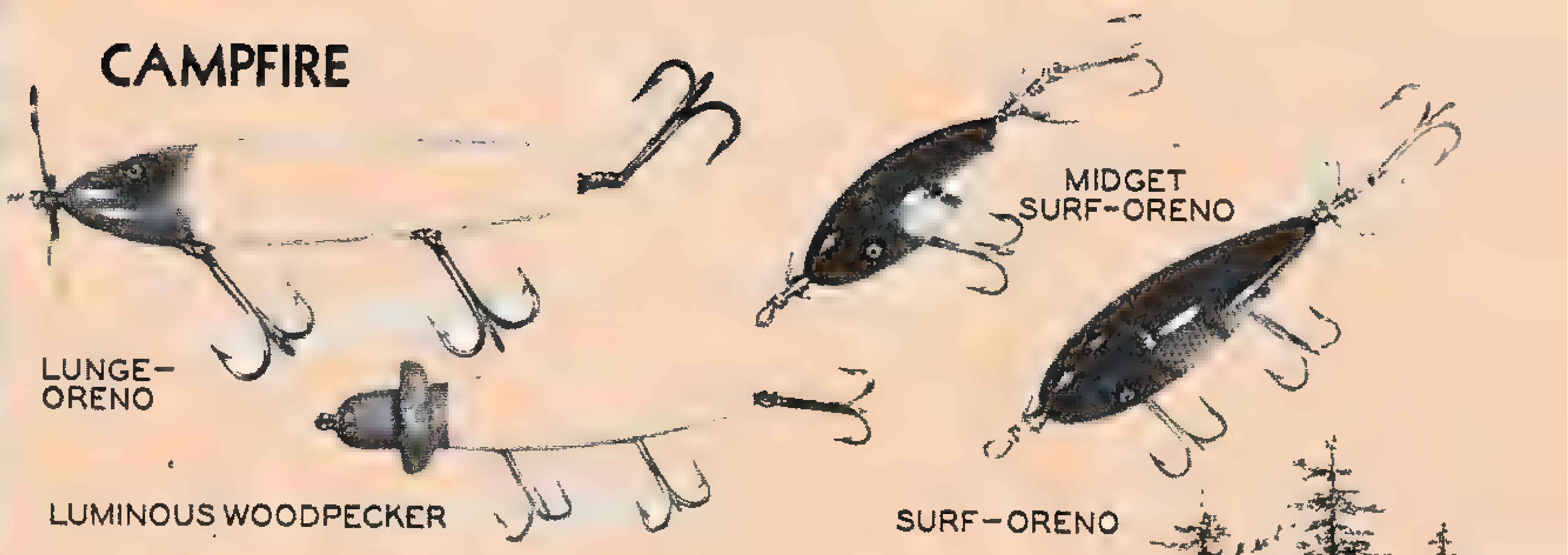
Above is a typical room air conditioning unit, which delivers washed air to lower the humidity.

Modern "weather-making machines" screen tons of dirt each year from the air we breathe. Dirt above was taken from a furnace filter.

What does electricity do to air? Dr. E. Vernon Hill (left) pioneer research authority, seeks the answer to this question by charging air with high voltage electricity, or ionizing it. He finds that negatives ions stimulate mental powers.

"Normally our air contains ozone, is clear and odorless," points out Dr. L. W. Chubb, director of research at Westinghouse. "In the big cities smoke and fumes cut off ultra-violet light, reduce ionization, and leave for us a stuffy, vitality-lacking air." In the above photo research engineer G. E. Penney demonstrates to Dr. Chubb the operation of an electro-static air cleaner. Electricity disintegrates smoke blown in at the left.

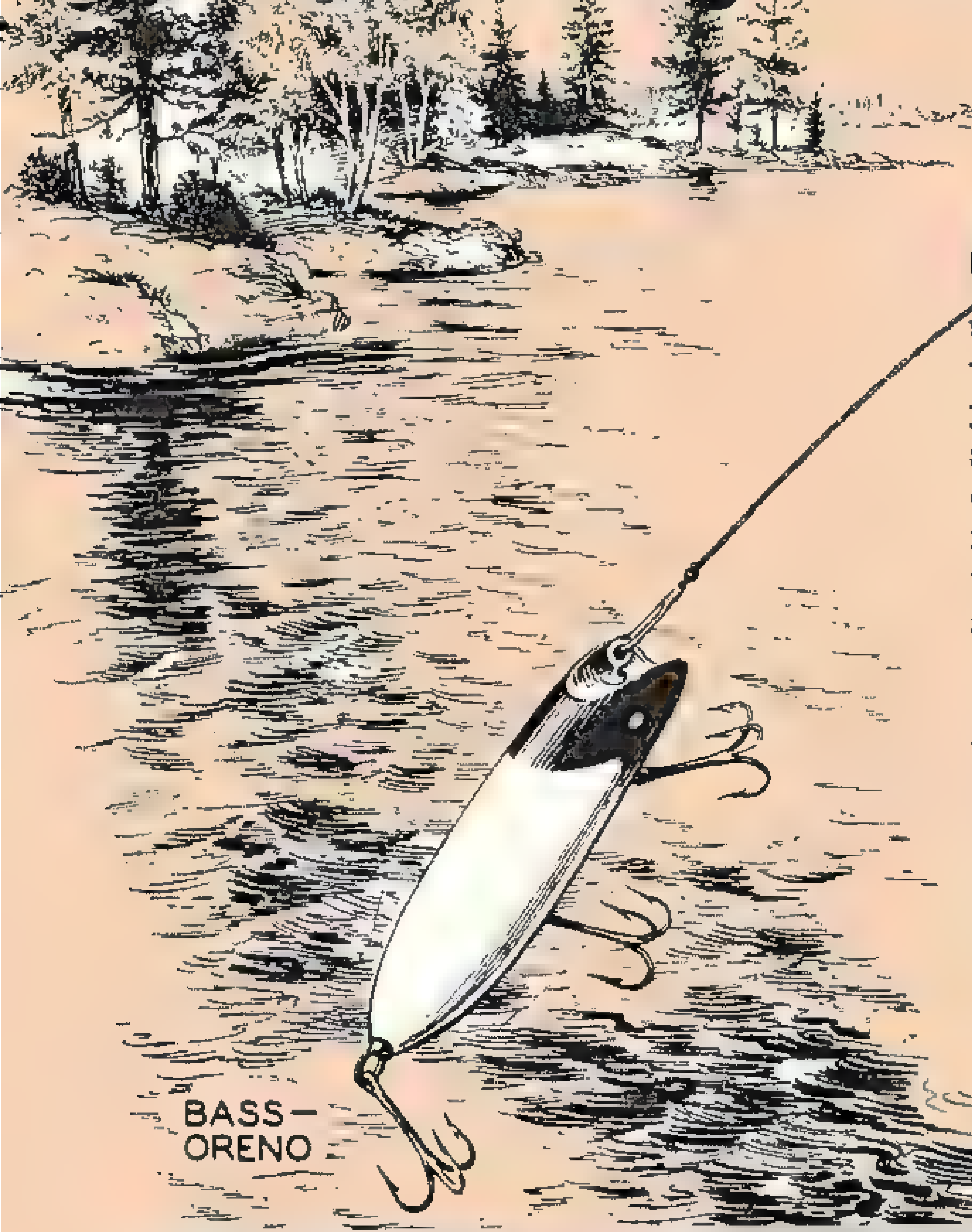




Choosing "SURE SHOT" CASTING LURES

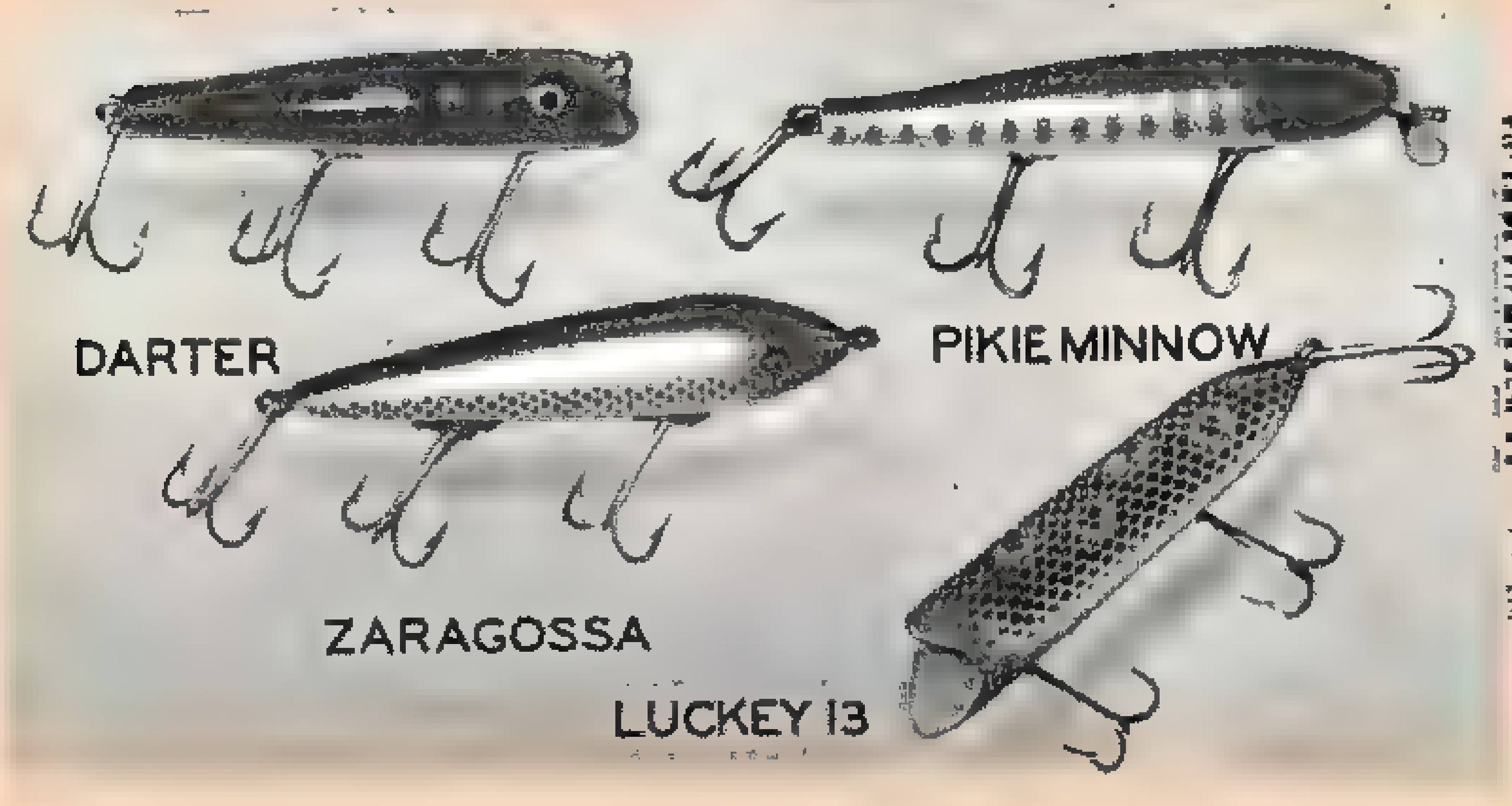
by ROBERT PAGE LINCOLN

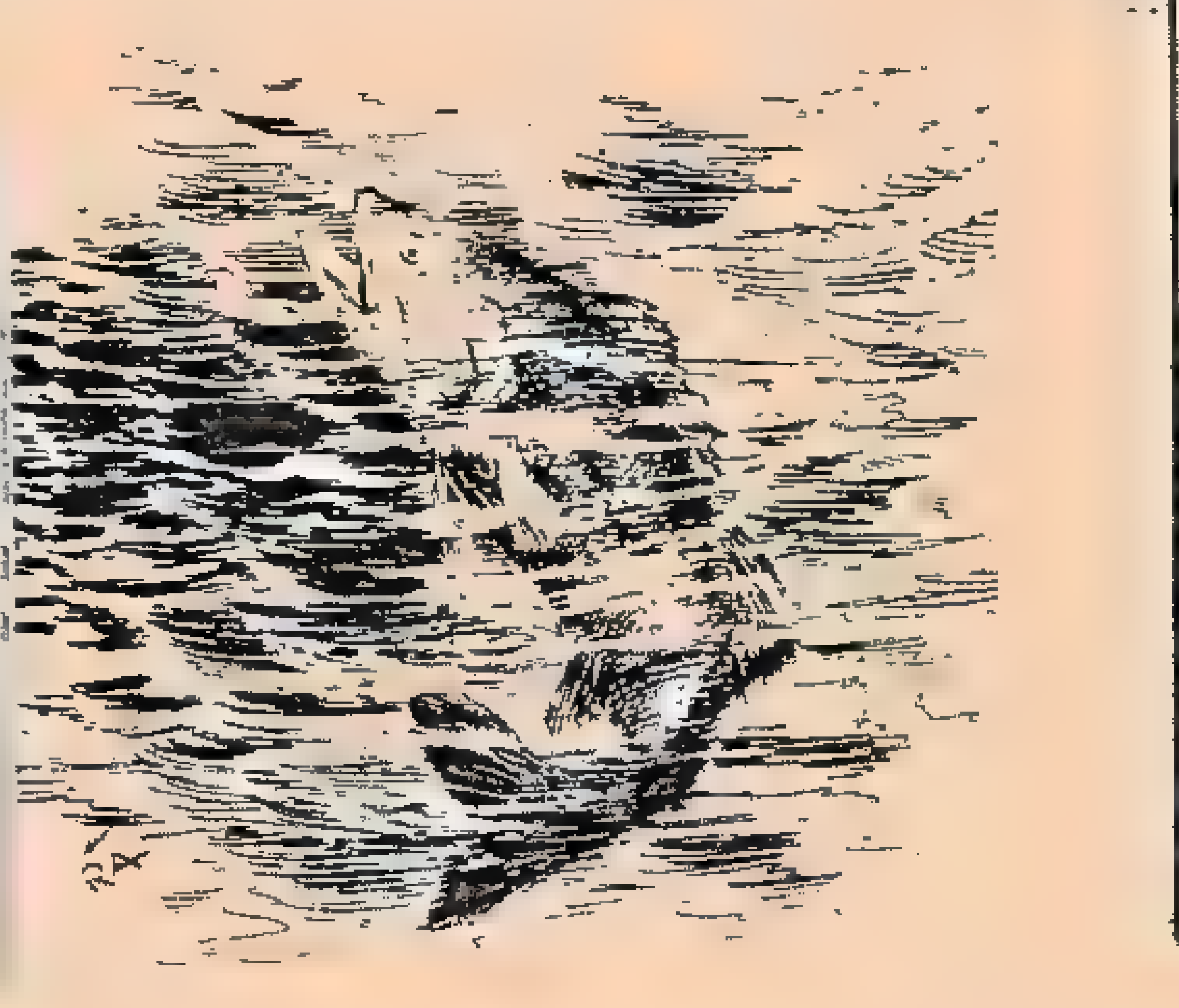
Hunting and Fishing Editor

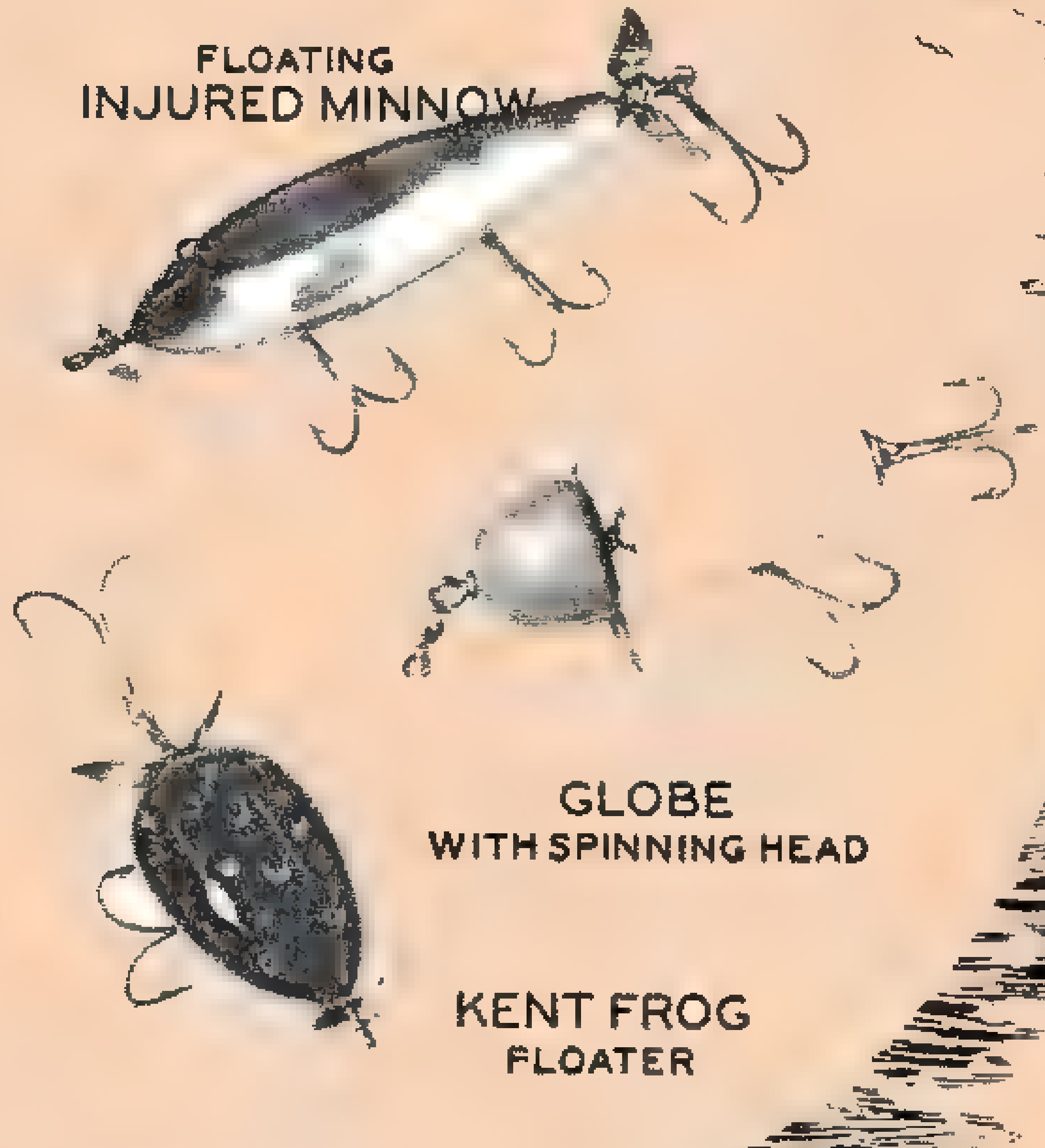


OF ALL the lures used in bait casting for bass none are as popular or more effective than bait casting plugs. There are thousands of these plugs on the market. If you are unacquainted with them, making a selection for the average tackle box is a difficult task. Here is a review of some of the most successful and popular plug lures and the type of fishing for which they are best suited.

Plug lures may be divided into three classes, namely: the surface lure that floats without diving, quartering, and otherwise setting up a fuss under the water; the surface lure that floats when not reeled, but which, when reeled, goes under the surface and weaves along in the familiar wobbling action; and, third, the weighted or heavy underwater plug, which has lead countersunk on its underparts to carry it deep in the water to get fish that lie deep. Among these three classes of plugs one makes his selection.







No bass lure in the plug class has had greater popularity than the so-called wobbler, a bait that floats when it is not reeled, but which dives under the surface when reeled. It has a gouge in the wood at the head—a metal headpiece, or some other de-

SELECTIONS FOR YOUR TACKLE BOX

THE WOBBLERS

BASS-ORENO—a very popular plug, known mostly for its red head and white body. Comes in other colors also. Intended to be cast and reeled right in.

ZIG-WAG—a jointed plug that is one of the most erratic and lively in action. Also can be popped or plunked on the surface.

PIKIE MINNOW—in either jointed or solid body types is one of the most effective plugs. Both are killers for bass, muskies, pike and pickerel. Dives deep when reeled or trolled.

CLASSIC MINNOW—a life-like surface wobbler that attracts practically all game fish. Cast up among lily pads, it is one of the most natural lures.

PALOMINE—has an attractive wobbling, wriggling, and diving action. Floats when not reeled. Also comes in jointed style. A favorite with game fishermen.

JOINTED VAMP SPOOK—a transparent plug that outlasts many wooden lures. Has a lively swimming action. A good all-around lure.

DARTER—darts about near the surface in exceptionally life-like manner. Best suited for popping.

ZARAGOSSA—a famous lure in the South, but equally good in the North. Floats, but dives when rod is jerked. Performs like wounded minnow.

LUCKY 13—a typical plunking or popping lure. When reeled operates under the surface like a wobbler.

SURFACE LURES

LUNGE-ORENO—a large bait very effective for muskies. Propeller stirs up water to attract fish.

SURF-ORENO—midget size good for bass. Larger size for bass and muskies. Front and rear propellers churn water. Red and white style good for dull days.

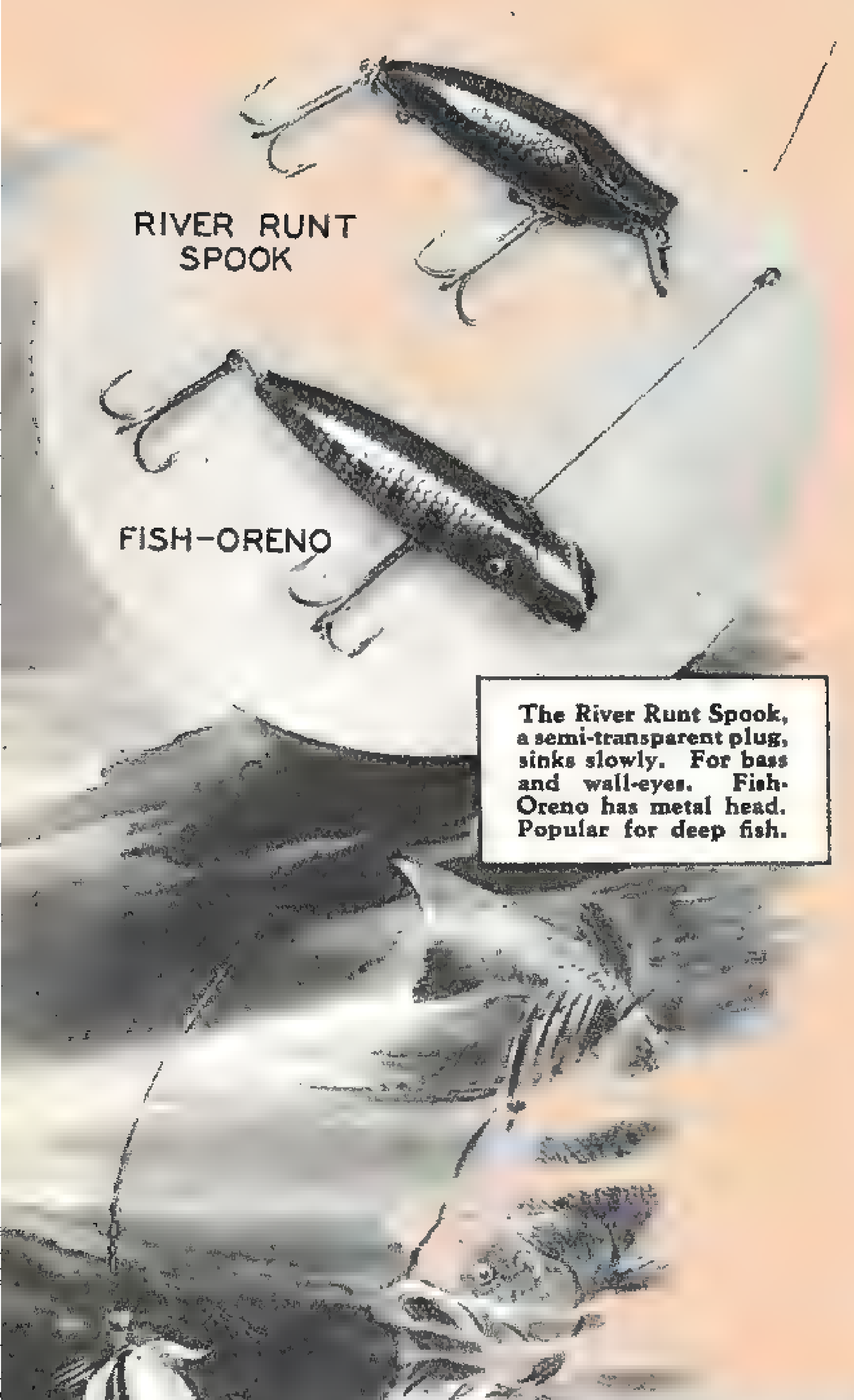
WOODPECKER—a luminous bait that is very effective at night. Stirs up water by means of concave collar.

INJURED MINNOW—lies on its sides and when jerked with rod-tip acts like struggling, injured minnow.

GLOBE—a revolving head lure that is effective in the evening, at night, just after daybreak, and on grey days. A sound making surface lure, especially good for roiled stream water.

KENT FROG—ideal for working among pads and weeds, as upturned hooks make it practically weedless. One propeller turns to right, the other to left.

UNDERWATER LURES For those Deep Fish



The River Runt Spook, a semi-transparent plug, sinks slowly. For bass and wall-eyes. Fish-Oreno has metal head. Popular for deep fish.

vice, which makes it weave along in the water in a lifelike manner. This erratic action probably convinces the fish that the bait is a small fish that has been maimed. Since fish in search of food are always attracted to a maimed or injured minnow, the chances of a catch with the use of a wobbling plug lure are great. The wobbler, therefore, in one style or another should be in your tackle box as one of the certain fish-getters. When making the selection some thought should be given to the color of the plug. On grey and rainy days, or when the water is somewhat dingy or obscured, or in the twilight or at dusk, the all-white wobbler with the red head is a very good selection. On bright days the darker wobblers can be used.

While on the subject of wobblers, we might mention the proper way to use them. When the lure drops to the water, allow it to remain there for a minute or so, then give it a jerk, popping it. Again allow a pause, then pop it again. Do this two or three times, with pauses in between.

In the class of wobblers are to be found the so-called "popping" or "plunking" lures. Although the wobbler, of the famous red-head type, is meant to be cast and reeled right in, without jerking it to make a popping or plopping sound on the surface, there are lures that fill the gap in this respect. They have a very erratic action, dipping, diving, quartering, and giving off a gurgling sound, and making bubbles on the surface as they are jerked. There are times when these plunking lures are

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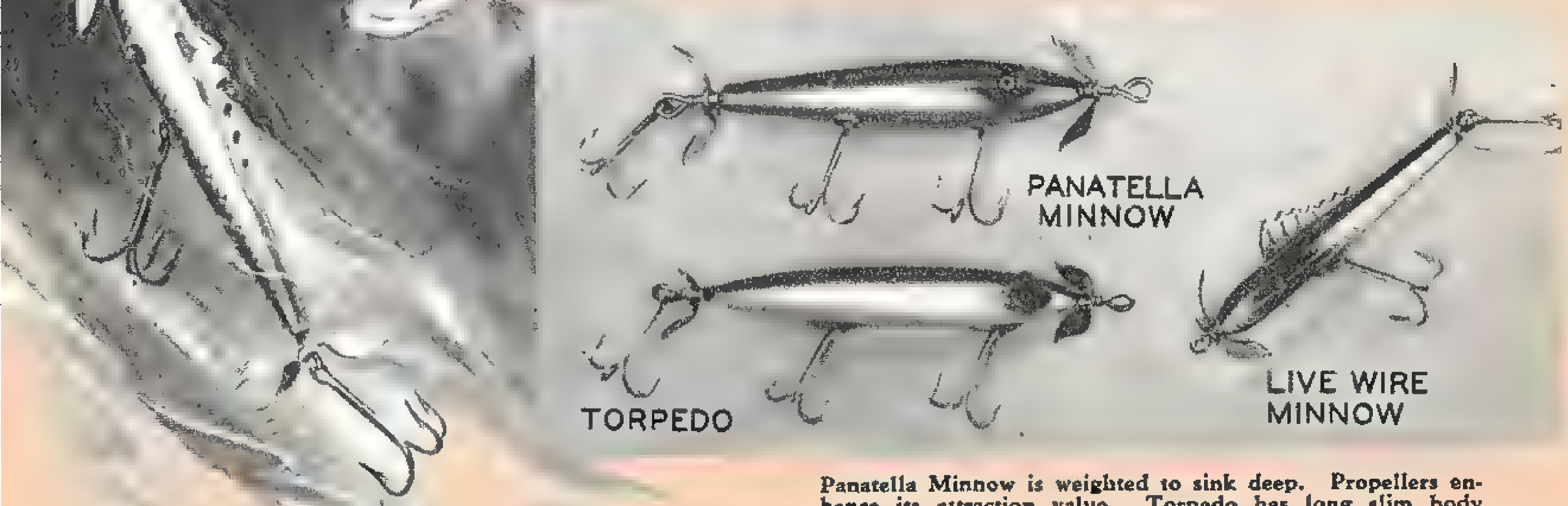

Panatella Minnow is weighted to sink deep. Propellers enhance its attraction value. Torpedo has long slim body believed to be best for holding hard-mouthed fish. Live wire rides right side up. Propellers revolve in opposite directions.

Simplify the Task of FISH CLEANING

by MARVIN SPITTLER

THE smashing strike of a ponderous black-bass, the bent rod, and the singing reel all provide joy to the heart of the ardent fisherman. But, in most cases, the fun ends with catching the fish. After eating the fish, fifty per cent of fishermen complain that their fish are soft and black-veined—that they taste of the slime of the weed beds in which they were caught.

This is true. But the fault is not with the fish; it is with the fisherman. How often does one see a large game fish gasping in the sun to die of suffocation with gaping mouth, glazed eyes and scales curling in the heat.

Fish should be kept alive until the excursion is over and then butchered by placing a sharp knife behind the gill and cutting a slanting gash down to the top of the head to bleed the fish.

When handling live fish, always wet the hands to preserve the scale covering which protects them from death.

The bad taste in fish comes from three sources; the blood, the slime under the scales, and the backbone. The blood, of course, is removed by butchering and the slime and backbone are removed in the cleaning. This method of cleaning fish will do away with the messy business of cleaning up entrails. After cleaning, all that remains is a solid carcass devoid of flesh.

After scaling the fish as shown, remove

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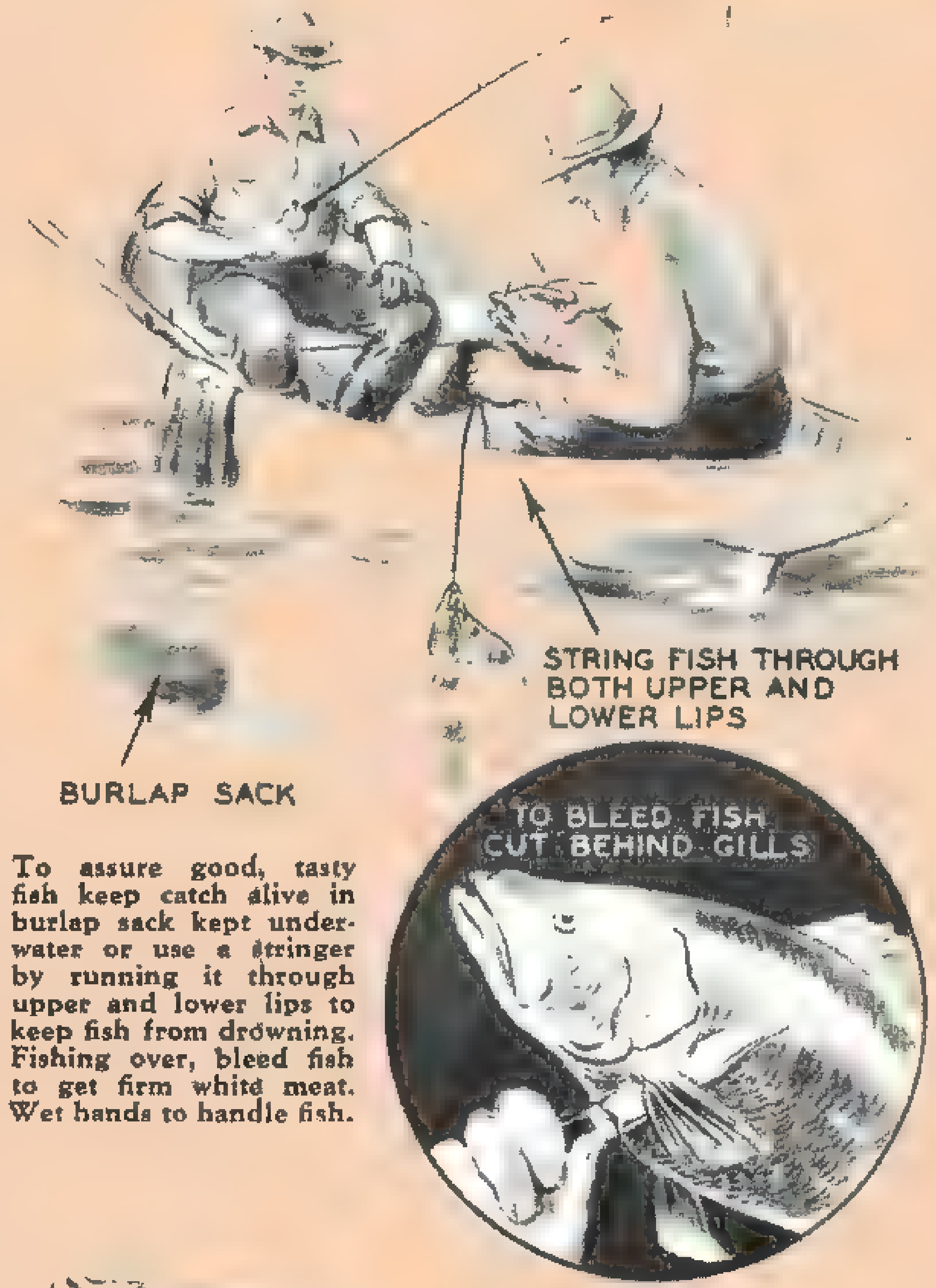
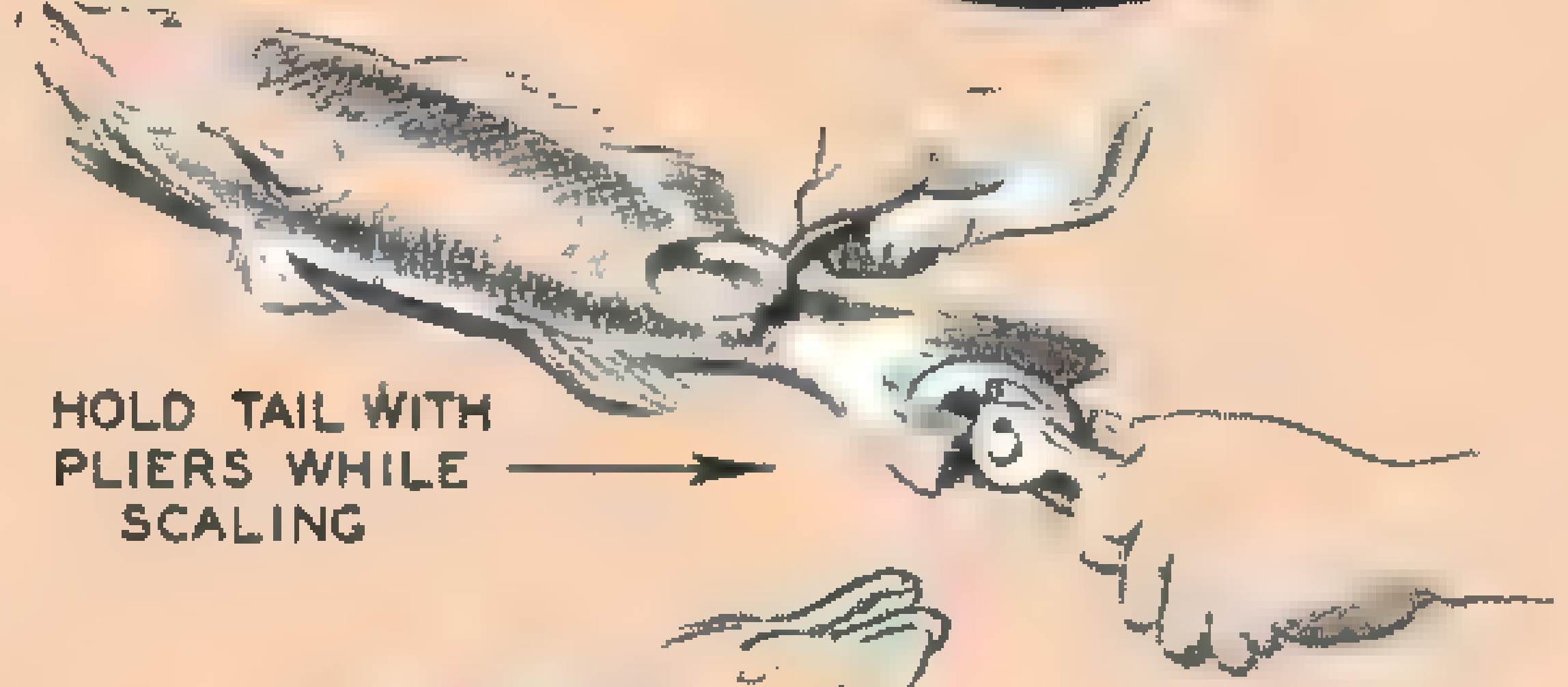
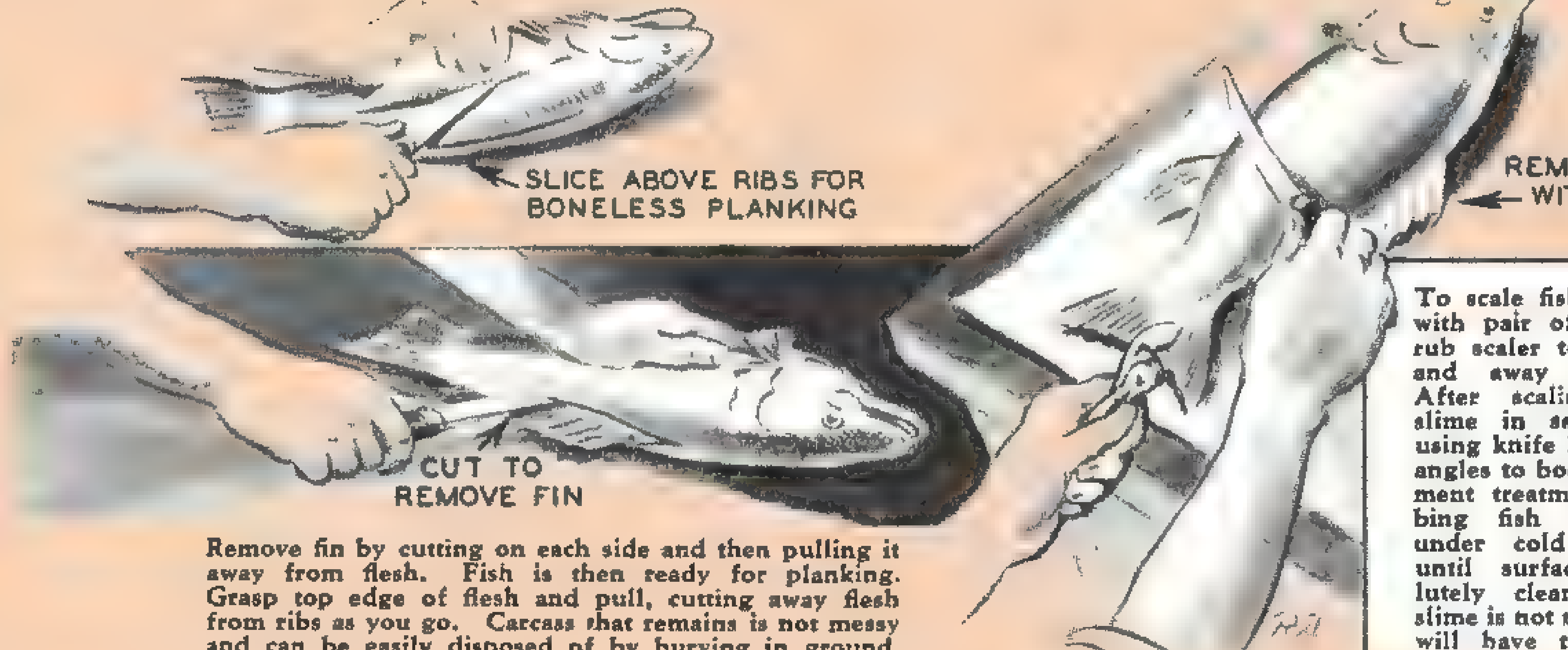

STRING FISH THROUGH BOTH UPPER AND LOWER LIPS
BURLAP SACK
TO BLEED FISH CUT BEHIND GILLS

To assure good, tasty fish keep catch alive in burlap sack kept underwater or use a stringer by running it through upper and lower lips to keep fish from drowning. Fishing over, bleed fish to get firm white meat. Wet hands to handle fish.


HOLD TAIL WITH PLIERS WHILE SCALING

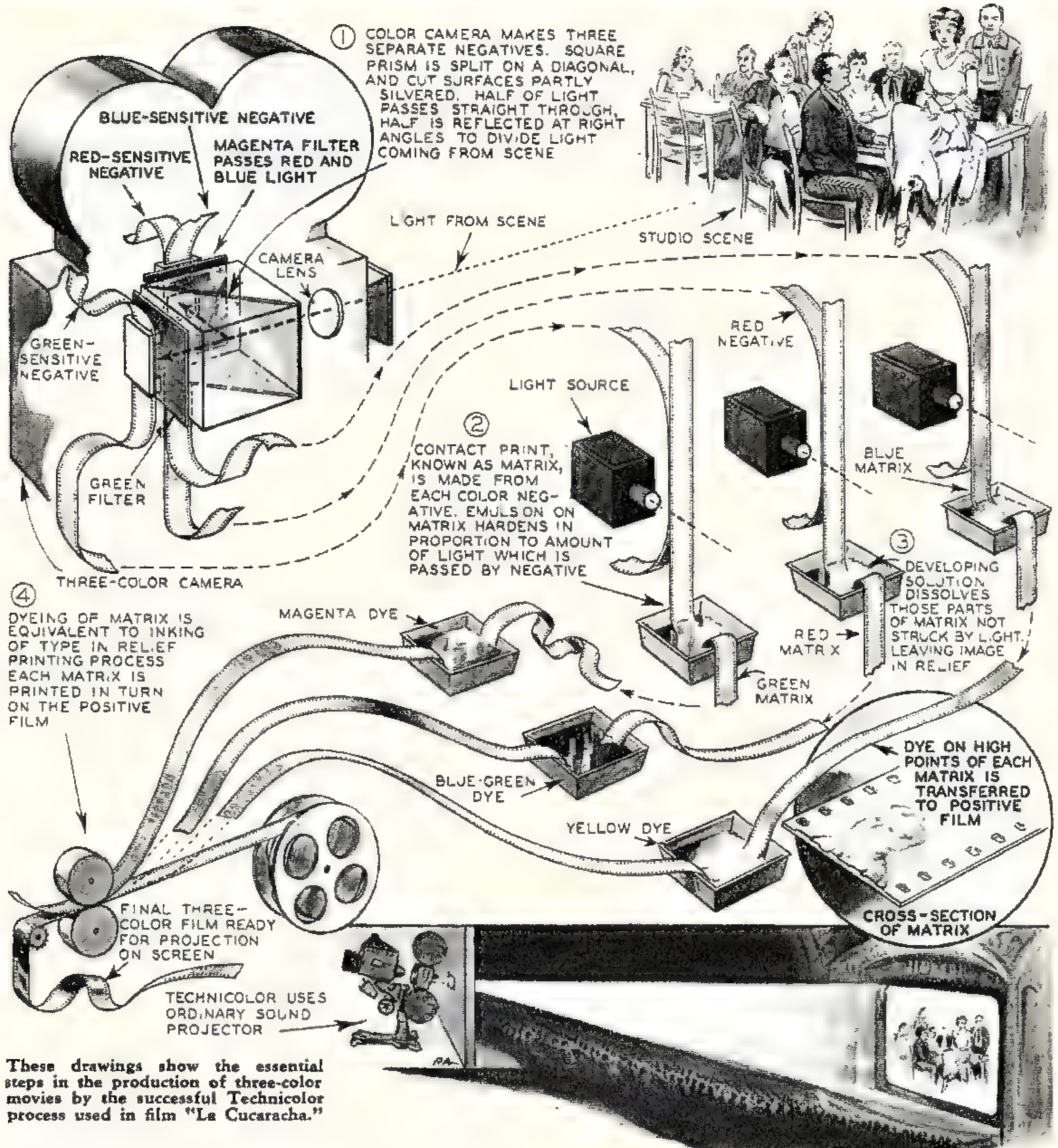

SLICE ABOVE RIBS FOR BONELESS PLANKING
CUT TO REMOVE FIN
REMOVING SLIME WITH KNIFE

Remove fin by cutting on each side and then pulling it away from flesh. Fish is then ready for planking. Grasp top edge of flesh and pull, cutting away flesh from ribs as you go. Carcass that remains is not messy and can be easily disposed of by burying in ground.

To scale fish, grasp tail with pair of pliers and rub scaler towards head and away from you. After scaling, remove slime in same manner using knife held at right angles to body. Supplement treatment by rubbing fish with hands under cold water tap until surface is absolutely clean. If this slime is not removed, fish will have tainted taste.

How THREE COLOR MOVIES ARE MADE

by EARL THEISEN


① COLOR CAMERA MAKES THREE SEPARATE NEGATIVES. SQUARE PRISM IS SPLIT ON A DIAGONAL, AND CUT SURFACES PARTLY SILVERED. HALF OF LIGHT PASSES STRAIGHT THROUGH, HALF IS REFLECTED AT RIGHT ANGLES TO DIVIDE LIGHT COMING FROM SCENE
BLUE-SENSITIVE NEGATIVE
RED-SENSITIVE NEGATIVE
MAGENTA FILTER PASSES RED AND BLUE LIGHT
LIGHT FROM SCENE
STUDIO SCENE
CAMERA LENS
GREEN-SENSITIVE NEGATIVE
GREEN FILTER
THREE-COLOR CAMERA
LIGHT SOURCE
RED NEGATIVE
② CONTACT PRINT, KNOWN AS MATRIX, IS MADE FROM EACH COLOR NEGATIVE. EMULSION ON MATRIX HARDENS IN PROPORTION TO AMOUNT OF LIGHT WHICH IS PASSED BY NEGATIVE
BLUE MATRIX
③ DEVELOPING SOLUTION DISSOLVES THOSE PARTS OF MATRIX NOT STRUCK BY LIGHT, LEAVING IMAGE IN RELIEF
RED MATRIX
GREEN MATRIX
④ DYEING OF MATRIX IS EQUIVALENT TO INKING OF TYPE IN RELIEF PRINTING PROCESS EACH MATRIX IS PRINTED IN TURN ON THE POSITIVE FILM
MAGENTA DYE
BLUE-GREEN DYE
YELLOW DYE
DYE ON HIGH POINTS OF EACH MATRIX IS TRANSFERRED TO POSITIVE FILM
CROSS-SECTION OF MATRIX
FINAL THREE-COLOR FILM READY FOR PROJECTION ON SCREEN
TECHNICOLOR USES ORDINARY SOUND PROJECTOR
RA

These drawings show the essential steps in the production of three-color movies by the successful Technicolor process used in film "La Cucaracha."

WOULD you like to know how the color in a Walt Disney Silly Symphony or in "La Cucaracha" is obtained? Have you ever wondered how a motion picture film, in which each picture is about the size of a postage stamp, is colored so it can be magnified 35,000 or more times and still retain the beautiful coloring of a Silly Symphony?

The actual application of the color to the film is not unlike the method used in printing a page of type. In the printing process, the type is set or a plate is made for each of the colors appearing in the picture or the printed page.

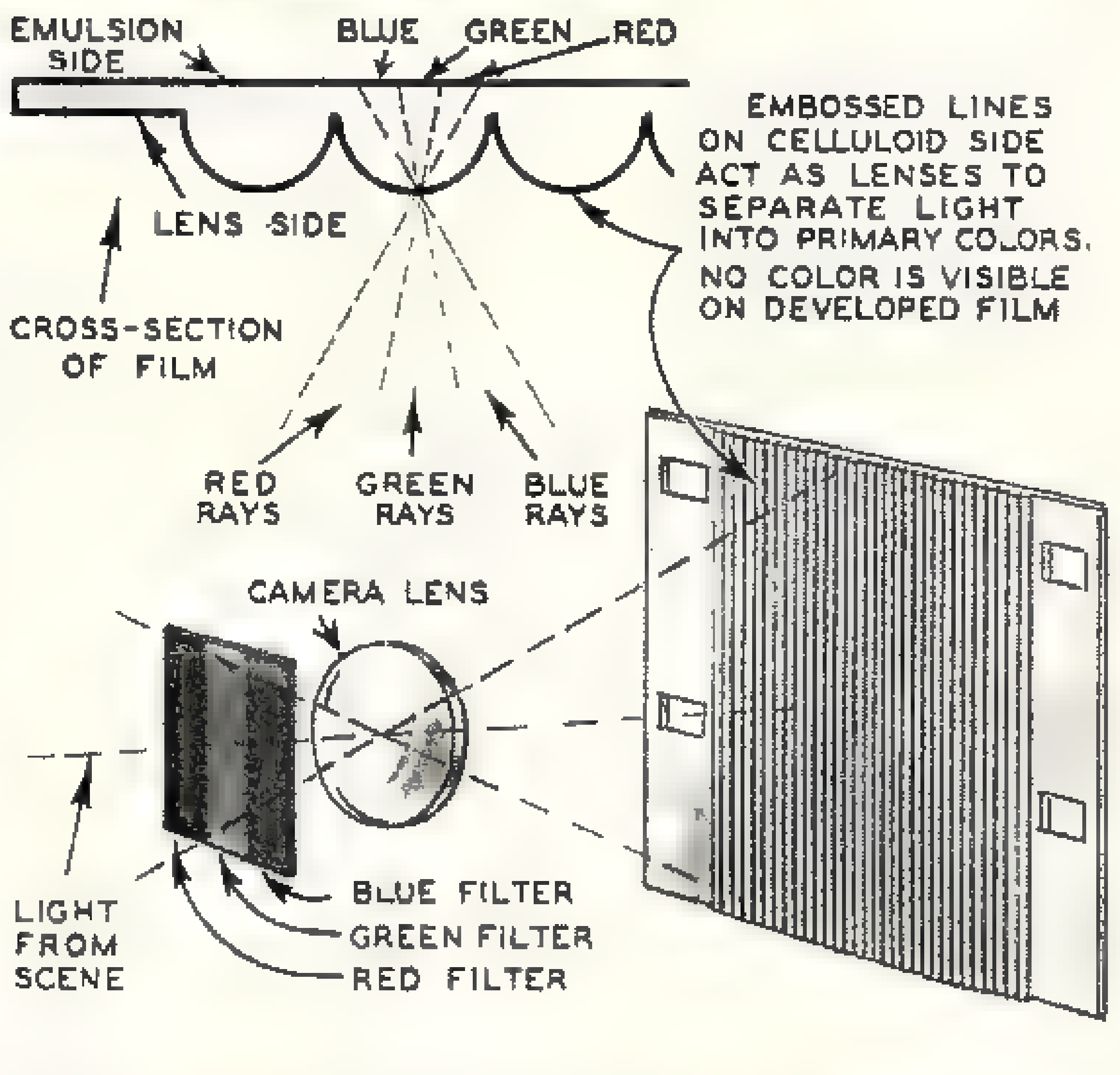
The plates or type of a printing press are in relief and the high portions of the plate receive an ink which is pressed into contact with the paper. The ink is transferred to the paper. In the motion picture, they do not use plates in that sense of the word. Instead, a "matrix" is used. This "matrix" is very similar to the printer's type or plate, and the color impression is made by dyeing the "matrix" and pressing it in contact with a motion picture film.

One of the frames from "La Cucaracha," a two-reel short which is proving to be the first notably successful color picture other than the three-color animated cartoons. Note the variable-density sound track at the left of the picture.

In a picture on paper, if the finished print shows three colors, three separate plates have to be made and the paper run through the press three times. In the same way a motion picture receives a printing, or an "imbibition," as it is known in the studios, for each color that appears on the screen.

Until the perfection of the Technicolor Three-Color process, which was first used in the Disney cartoons, all motion pictures were colored in only two colors; namely, red-orange and green-blue. Of course the use of only two colors resulted in a limited color range. Now, however, with the perfection of a method of applying three colors, a more natural and true to life color on the screen is possible. This was brought about through the enterprise of Dr. Herbert T. Kalmus.

The Technicolor Three-Color process is the nearest approach to the colors and delicate shades found in nature. It was perfected for Technicolor under the supervision of J. A. Ball, and was first commercially used in 1932 in the Walt Disney Silly Symphony, "Flowers and Trees." The same process was first used in a real-life picture, "The House of Rothschild," in a color sequence supervised by Natalie Kalmus. It was also used in "La Cucaracha," a two-reel short which has taken the country by storm because of its beautiful color. Financed by John H. Whitney at a cost of $65,000, which is over three times the cost of an uncolored picture of the same length, this is proving to be the first notably successful color film outside of the cartoons.


EMULSION SIDE
BLUE
GREEN
RED
EMBOSSED LINES ON CELLULOID SIDE ACT AS LENSES TO SEPARATE LIGHT INTO PRIMARY COLORS. NO COLOR IS VISIBLE ON DEVELOPED FILM
LENS SIDE
CROSS-SECTION OF FILM
RED RAYS
GREEN RAYS
BLUE RAYS
CAMERA LENS
LIGHT FROM SCENE
BLUE FILTER
GREEN FILTER
RED FILTER

Lenses embossed in film provide color separation in Kodacolor process developed by Eastman Kodak to give color movies to amateur movie fans using 16 millimeter film. Both camera and projector must have the special three-color filter, since finished Kodacolor film shows no color.

In photographing a Disney Silly Symphony,

[*Continued on page* 122]

America's Part in Soviet Engineering Triumphs

DNIEPROGES— WORLD'S GREATEST POWER PLANT

FEW people realize, even today, how important a part America played in the greatest drama in history, the Five Year Plan of Soviet Russia.

This octopus-like rebuilding program, which provided mighty power plants, towering steel mills, and humming factories surpassed in size only by the American plants after which they were patterned, was brought to a highly successful conclusion in 1932. The second Five Year Plan of the U. S. S. R., now half-completed, calls for more factories and more machines, but stresses the production and consumption of Soviet-made goods.

With the establishment of friendly relations between the Soviet and American governments, greater and greater interest is being taken by Soviet engineers in the mass production methods employed by American manufacturers. Many Soviet commissions are being sent to this country to make studies in different industrial fields, and to make preliminary arrangements for the purchase of American-made machinery.

In the great iron and steel-working factories American technical methods are most evident. Largest in Europe are the Gorky and AMO (Moscow) automobile factories. At Gorky alone 140,000 Ford trucks and passenger cars a year can be turned out by American assembly line machinery.

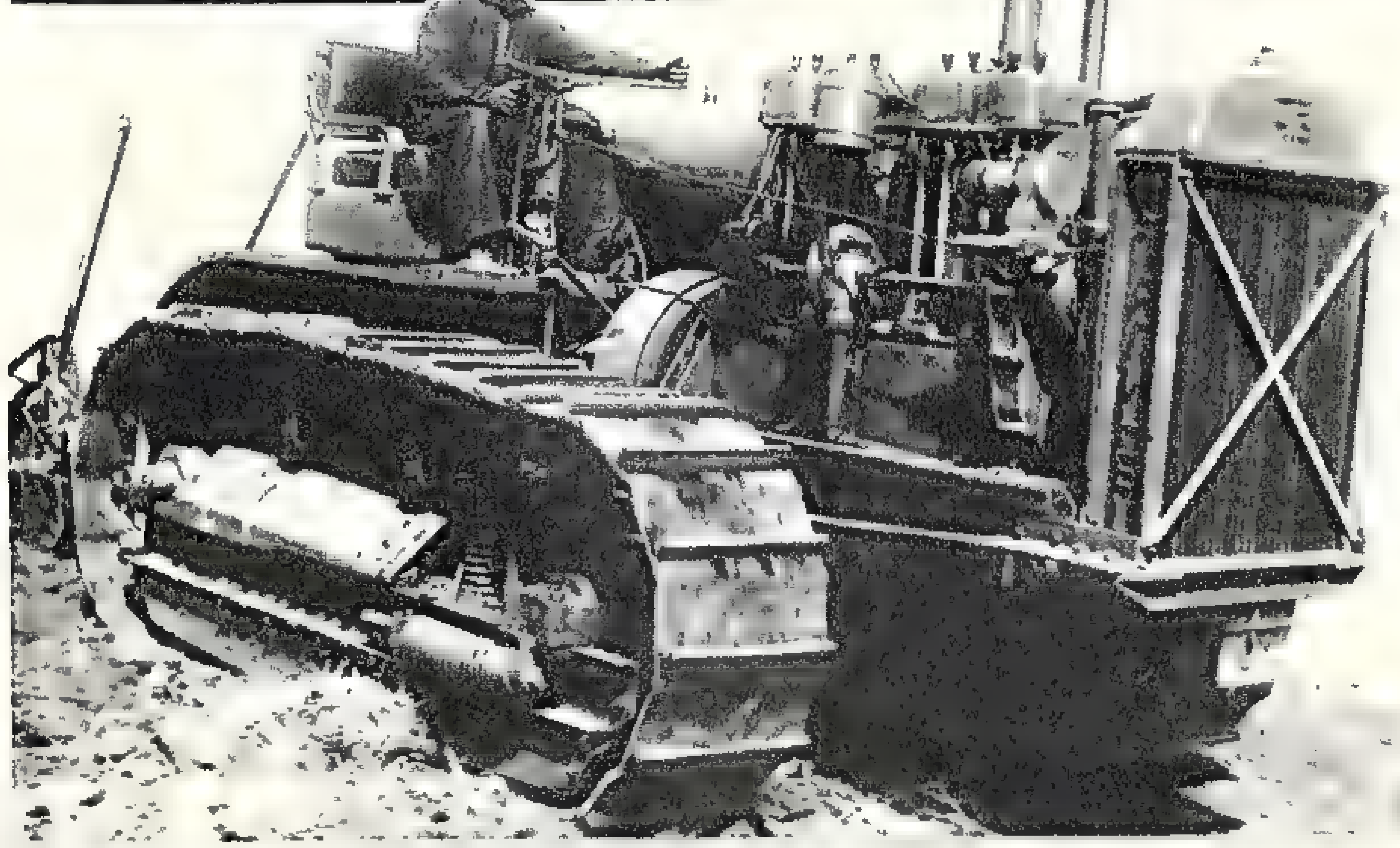
High in the Ural mountains is Magnitogorsk, largest of European steel mills, the supply center for the metal industry. Here four blast furnaces are belching flame and smoke into the heavens day and night, converting a daily quota of 1,000 tons of iron ore into high quality pig iron. At Kuznetz, in Central Siberia, are three huge American-type blast furnaces, half a dozen open hearth furnaces, and other steel-working equipment.

Serving the steel machinery industry is the impressive Moscow ball-bearing plant, capable of producing 24,000,000 steel balls and roller bearings a year, of 100 different types.

Probably the largest caterpillar-type tractor plant in the world is at Cheliabinsk. This single plant is capable of turning out 40,000 tractors a year for Soviet agriculture and industry.

Soviet metal workers point with pride to the largest welded steel bridge in the world, spanning the Avushka river at Stalinsk.

Starting operation this year at Kharkov, the world's largest turbo-generator works is

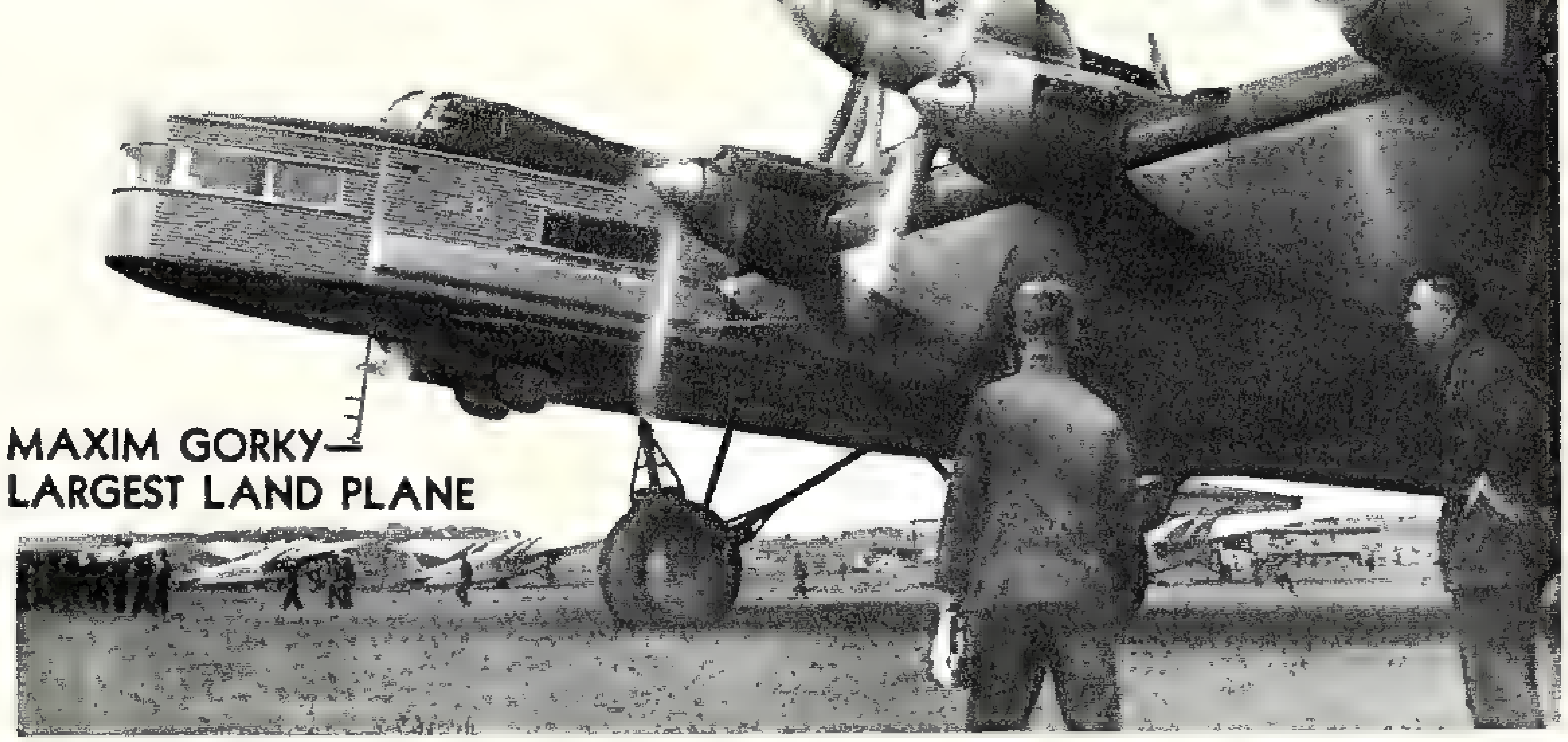


POWER FARMING

Little more than a decade ago, there was born from revolution and chaos the Union of Socialist Soviet Republics, a gigantic empire of a hundred different nationalities. The rebuilding of U. S. S. R. by Five-year Plans is the world's greatest engineering miracle.

AN OCEAN OIL WELL

MIGHTY MAGNITOGORSK BLAST FURNACES



MAXIM GORKY— LARGEST LAND PLANE

American engineers, American materials, American money played no little part in the success of Russia's empire-rebuilding program. From this budget of work and progress came forth mighty power plants, steel mills, factories, many the largest in the world.

EXPLORE Lake BOTTOMS With RADIOPHONE DIVING Helmet

This helmet for amateur divers, with its built-in two-way radiophone communication system, is designed for both pleasure and profit. With it you can carry out under-water phofography, study the habits of fish, locate sunken outboard motors and boats, or merely explore.

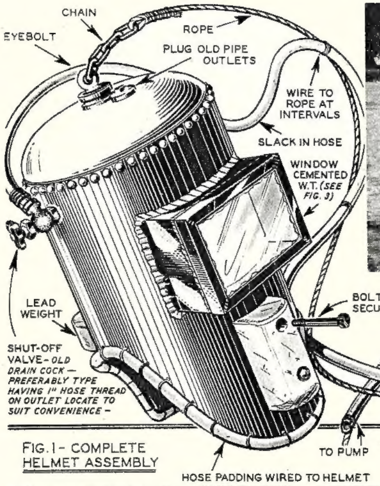
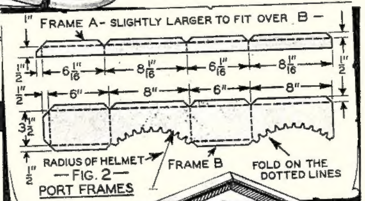

CHAIN
EYEBOLT
ROPE
PLUG OLD PIPE OUTLETS
WIRE TO ROPE AT INTERVALS
SLACK IN HOSE
WINDOW CEMENTED W.T. (SEE FIG. 3)
LEAD WEIGHT
SHUT-OFF VALVE-OLD DRAIN COCK — PREFERABLY TYPE HAVING 1" HOSE THREAD ON OUTLET LOCATE TO SUIT CONVENIENCE —
BOLT LEAD WEIGHTS SECURELY TO HELMET
TO PUMP
HOSE PADDING WIRED TO HELMET

FIG. 1- COMPLETE HELMET ASSEMBLY

Complete diving unit as used by author of this article. Phone set worn is the one used by shore man.

APPROXIMATE WATER PRESSURE		
DEPTH	LBS. PER SQ. INCH	
10 FEET	4.5 " " "	
20 "	9.0 " " "	
30 "	13.0 " " "	
40 "	17.5	"EXPERIENCED DIVERS ONLY
50 "	22.0	

Pump used must deliver even flow of air in excess of pressure shown at left for each depth to keep water out of diving helmet.


1" FRAME A- SLIGHTLY LARGER TO FIT OVER B —
6 1/16"
8 1/16"
6 1/16"
8 1/16"
1/2"
6"
8"
6"
8"
3 1/2"
1"
RADIUS OF HELMET
FRAME B
FOLD ON THE DOTTED LINES

— FIG. 2 — PORT FRAMES

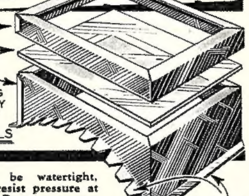
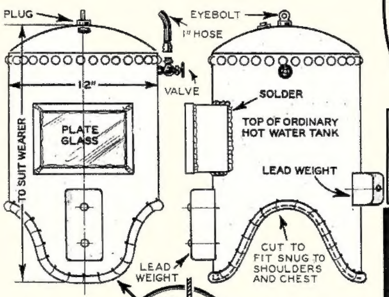

FRAME A
3/16" PLATE GLASS
FRAME B-SOLDER OR WELD FRAMES TOGETHER SEATING GLASS WITH PLENTY OF MARINE CEMENT
BEND OUT

FIG. 3-PORT DETAILS

Glass port must be watertight, strong enough to resist pressure at maximum depth. Be sure to use good plate glass, cemented in place.


PLUG
EYEBOLT
1" HOSE
VALVE
12"
TO SUIT WEARER
PLATE GLASS
SOLDER
TOP OF ORDINARY HOT WATER TANK
LEAD WEIGHT
CUT TO FIT SNUG TO SHOULDERS AND CHEST
LEAD WEIGHT
FRONT VIEW
SIDE VIEW

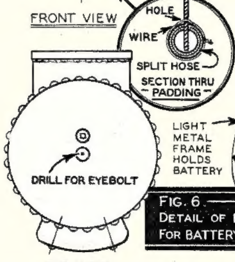

HOLE
WIRE
SPLIT HOSE
SECTION THRU PADDING
DRILL FOR EYEBOLT
TOP VIEW

FIG. 4 - THREE-VIEW DRAWINGS OF HELMET

Cut helmet from old water tank, to size which will give sufficient head room. Hose and safety line should be about 50 feet long, and new. Bolts hold each weight.

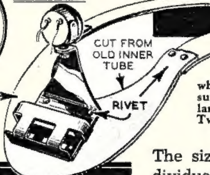
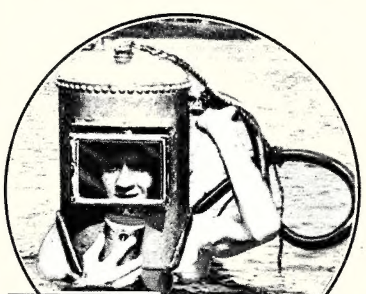

CUT FROM OLD INNER TUBE
RIVET
LIGHT METAL FRAME HOLDS BATTERY

FIG. 6 — DETAIL OF BREAST PLATE FOR BATTERY & TRANSMITTER



Ready to dive—lead weights sink helmet slowly when air is pumped in. No shoulder straps are needed.

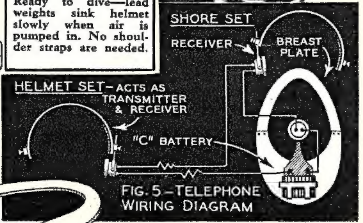

SHORE SET
RECEIVER
BREAST PLATE
HELMET SET - ACTS AS TRANSMITTER & RECEIVER
"C" BATTERY

FIG. 5 – TELEPHONE WIRING DIAGRAM

Radio earphones act as both transmitter and receiver in this simple communication system which permits diver to give instructions to man at surface. A 4½-volt C battery supplies the power—large battery may be used if more volume is desired. Two waterproof wires are run from helmet to surface.

by GARRY GROVER

AMATEUR diving is rapidly becoming one of the most popular of summer sports. Along both the Atlantic and Pacific seaboards and in almost every inland lake and river, under-water explorers are rapidly pushing back the last American frontier, delving into secrets of nature which for countless ages have been concealed by tons and tons of water.

With the diving helmet described here, a measured depth of approximately fifty feet, believed to be a record for amateur divers, was reached at Lake Minnetonka, near Minneapolis, Minn. Many other dives made with this helmet have been over an hour in length. If a few simple precautions are observed, there is no more danger in diving with a helmet than in ordinary swimming. The added feature of the two-way radiophone set, eliminates many of the dangers of amateur diving. The person at the surface, operating the pumps, is always in direct communication with the diver, and knows just what he is doing.

The helmet is constructed from the top of an ordinary hot water tank. The tank should be cut sufficiently long to allow the user plenty of head room. It is then cut to fit over the shoulders and chest as shown in Figures 1 and 4. This should be done with care, as a good fit means more comfort and less loss of air. Next, the port or window should be cut out. This is best located by trying the helmet on and marking the approximate position. The size of the port depends upon the individual, but should be at least 6"x8". These cuts may be made either with a cold chisel or with a cutting torch. The latter is the more simple but it is also more expensive.

The window frame "B" is made as shown in Fig. 2, from heavy galvanized iron, and soldered into place. The frame "A" is made of the same material, but is made enough larger to fit over frame "B". Plate glass is used for the port glass and is held in place with some type of marine cement or ordinary aquarium cement obtainable at pet shops. The cement used should be thick and pasty, but should not harden too hard. The frame "A" is then soldered into place.

The shoulder padding is made from garden hose. The hose is split lengthwise and wired through small holes drilled around the base of the helmet, as shown in detail sketches, Fig. 4.

[Continued on page 124]

AMATEUR DIVING PRECAUTIONS

Unless you are a good swimmer, don't try diving.

Make only shallow dives until you have had some experience in walking under water with a weighted helmet.

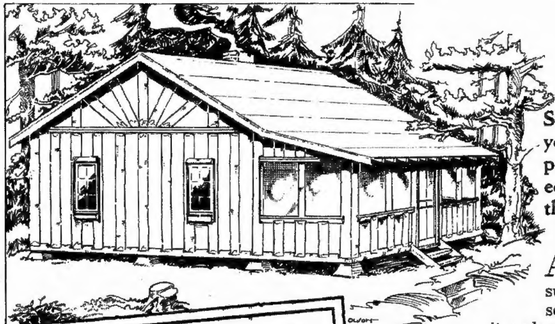
Be sure a good swimmer is always at hand in case of accident. The cold water may bring on cramps.

Use two safety ropes, one around your waist, the other attached to the helmet, and both tied to the air line at intervals. Both ropes and hose should be new.

Under ordinary circumstances, do not go deeper than 30 feet with this helmet. Deeper dives involve an element of danger, and are best made with regular diving suits.

If the water is rising in your helmet, call for more air. You can always push off the helmet and swim to the surface if the pumps stop or the air line breaks.

A Semi-Log Cabin for Your Vacation Home



by
O. E. OLSON

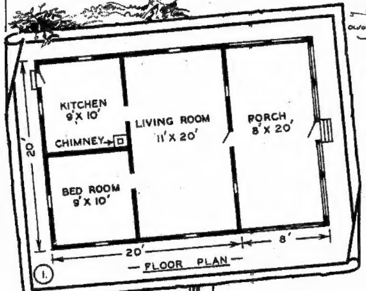
Simple to construct, yet pleasing in appearance, this cabin is economically ideal for that summer retreat.

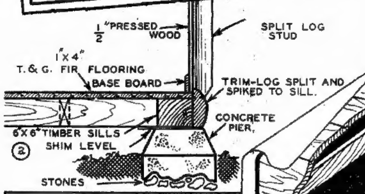
ANYONE handy with tools can build this summer cabin. The semi-log trimming gives it a pleasant rustic appearance. The use of pressed wood panels greatly simplifies its construction and performs a double duty by providing a neat, smooth interior finish. The cabin is twenty by twenty-eight feet in size and has four rooms, including the porch.

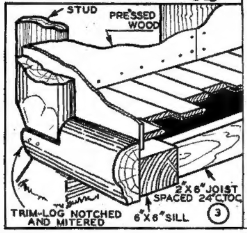
It can be built at low cost, from $200 to $300, depending on location and the price of logs in the vicinity. The timber can be cut by the builder, reducing his expense. In that case, it is necessary to cut the logs and peel them a season ahead of time to allow time for drying. Logs, already peeled and seasoned, can usually be purchased in the vicinity. Portable saw mills can also be found in the timber country. They can be brought to the cabin site to split the logs at a nominal cost. An experienced builder, with adequate help, can construct this cabin and have it ready for occupancy in a few days.

Approximately sixty well seasoned pine or cedar logs of 8-foot lengths are required for the construction of the cabin. These logs or posts should be selected for uniform size and straightness, 8" butts being preferred.

With the material on location, start with the foundation. If the soil is light or sandy dig down about a foot and partly fill the hole with rocks, erect a shallow box for the upper form and pour in concrete. Make twelve such piers locating one directly under the chimney stool. If large rocks are plentiful and the ground firm, use boulders, well set, in place of concrete piers. Place 6" by 6" sills level on the foundation in such a manner as to leave room for the trim-log, as shown in Fig. 2. Rip off one edge of trim-log to allow at least


KITCHEN 9'X10'
LIVING ROOM 11'X20'
PORCH 8'X20'
CHIMNEY
BED ROOM 9'X10'
20'
20'
8'
FLOOR PLAN
1


1/2" PRESSED WOOD
SPLIT LOG STUD
1"X4" T.&G. FIR FLOORING
BASE BOARD
TRIM-LOG SPLIT AND SPIKED TO SILL.
CONCRETE PIER.
6"X6" TIMBER SILLS SHIM LEVEL
STONES
2


STUD
PRESSED WOOD
2"X6" JOIST SPACED 24"C.TO C.
TRIM-LOG NOTCHED AND MITERED
6"X6" SILL
3

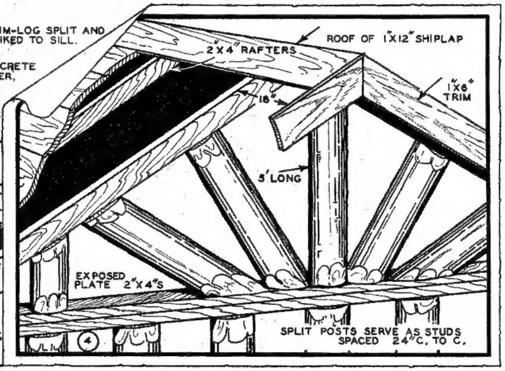
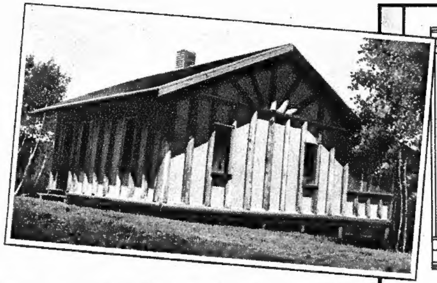
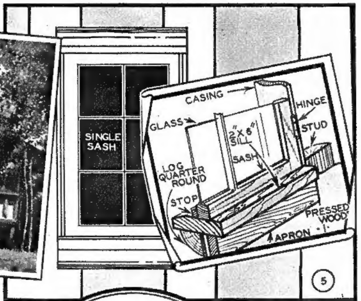
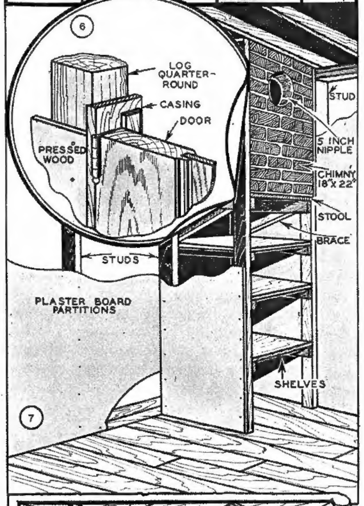

ROOF OF 1"X12" SHIPLAP
2"X4" RAFTERS
1"X6" TRIM
18"
3' LONG
EXPOSED PLATE 2"X4"S
SPLIT POSTS SERVE AS STUDS SPACED 24"C. TO C.
4

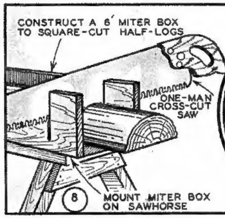
Fig. 1 shows floor plan of the cabin which can be changed to suit builder. The 2"x6" floor joists in Figs. 2 and 3 rest on a 6" square beam running down the center of the floor plan. It is advisable to use concrete piers under this beam also. The sunburst effect in Fig. 4 is an attractive feature, yet provides a sturdy support for the roof.

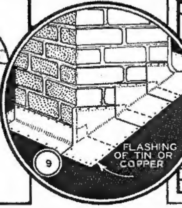


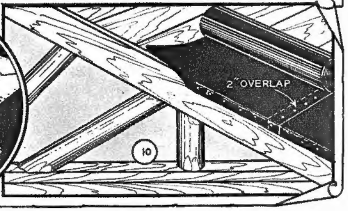
Here is a side view of the completed cabin, showing the sunburst roof supports and rear door from the kitchen.


SINGLE SASH
CASING
HINGE
GLASS
2"X6" SILL
STUD
SASH
LOG QUARTER ROUND
STOP
PRESSED WOOD
APRON
5


6
LOG QUARTER-ROUND
CASING
DOOR
PRESSED WOOD
STUD
5 INCH NIPPLE
CHIMNY 18"X22"
STOOL
BRACE
STUDS
PLASTER BOARD PARTITIONS
SHELVES
7


CONSTRUCT A 6' MITER BOX TO SQUARE-CUT HALF-LOGS
ONE-MAN CROSS-CUT SAW
MOUNT MITER BOX ON SAWHORSE
8


FLASHING OF TIN OR COPPER
9


2" OVERLAP
10

By building the miter box in Fig. 8 square cutting of logs will be simplified. The chimney rests on a stool five feet above the floor. Shelving, built into the stool, provides pantry space in the kitchen. Lay roofing as shown in Fig. 10.

Completing "NOMAD"

by SAM S. RABL

Naval Architect

Here is a boat that will meet the needs of inland water sailors. Her four designs provide a selection that answers all purposes.

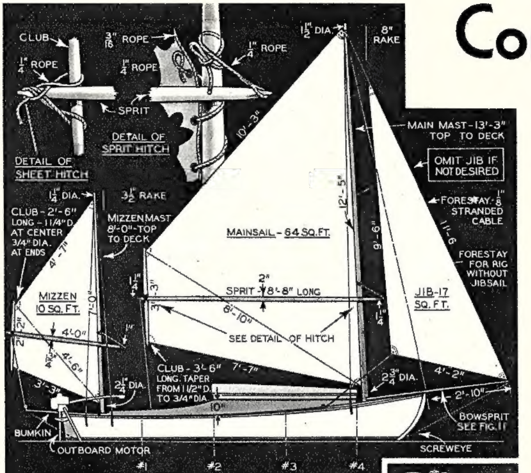

CLUB
¼" ROPE
3/16" ROPE
¼" ROPE
¼" ROPE
SPRIT
DETAIL OF SPRIT HITCH
DETAIL OF SHEET HITCH
1½" DIA.
8" RAKE
10'-3"
MAIN MAST-13'-3" TOP TO DECK
OMIT JIB IF NOT DESIRED
FORESTAY-⅛" STRANDED CABLE
12'-5"
9'-6"
11'-6
FORESTAY FOR RIG WITHOUT JIBSAIL
JIB-17 SQ. FT.
1¼" DIA.
3½" RAKE
CLUB-2'-6" LONG-1 1/4" D. AT CENTER 3/4" DIA. AT ENDS
MIZZENMAST 8'-0"-TOP TO DECK
MAINSAIL-64 SQ.FT.
4'-7"
7'-0"
MIZZEN 10 SQ. FT.
2"
SPRIT-8'-8" LONG
1¼"
3"
8'-10"
SEE DETAIL OF HITCH
4'-0"
4'-6"
1"
CLUB-3'-6" LONG. TAPER FROM 1 1/2" D. TO 3/4" DIA.
7'-7"
2¼" DIA.
2¾" DIA.
4'-2"
2'-10"
3'-3"
10"
BOWSPRIT SEE FIG. 11
BUMKIN
OUTBOARD MOTOR
SCREWEYE
#1
#2
#3
#4

FIG. 9 – CRUISING RIG – SAIL PLANS & SPRIT-RIG DETAILS

Drawing above shows Nomad as a ketch rigged auxiliary cruiser with details of the spars, rigging, sails and sprit hitch. The cabin may be made longer than that shown above.

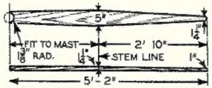

5"
FIT TO MAST
1⅜" RAD.
2' 10"
1¼"
¼"
STEM LINE
1"
5'-2"

FIG. 11 – DETAIL OF NOMAD'S BOWSPRIT

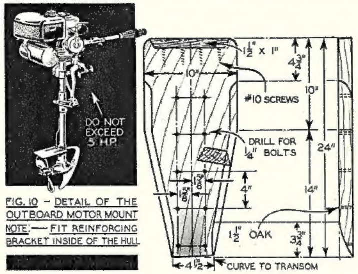
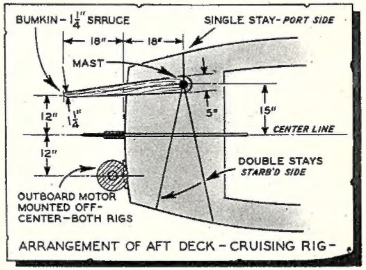

DO NOT EXCEED 5 H.P.
1½" x 1"
4¾"
10"
#10 SCREWS
10"
DRILL FOR ¼" BOLTS
24"
4"
14"
1½" OAK
3¾"
4½"
CURVE TO TRANSOM

FIG. 10 – DETAIL OF THE OUTBOARD MOTOR MOUNT NOTE:— FIT REINFORCING BRACKET INSIDE OF THE HULL

In either the ketch rigged cruiser or outboard cruiser designs, do not use a motor over five h.p. If you plan to use a motor as auxiliary power, the outboard motor mount above must be fitted to the transom and the transom reinforced with brackets. Fig. 11 shows shape of the bowsprit.


BUMKIN-1¼" SRRUCE
SINGLE STAY-PORT SIDE
18"
18"
MAST
12"
1¼"
5"
15"
CENTER LINE
12"
DOUBLE STAYS STARB'D SIDE
OUTBOARD MOTOR MOUNTED OFF-CENTER-BOTH RIGS

ARRANGEMENT OF AFT DECK – CRUISING RIG –

To give rudder and tiller free play the mizzen mast and outboard motor, if used, are placed off center as shown above. Shape of bumkin and rigging are also given in detail.

PART II

NOMAD, the boat that combines four designs in one, will appeal to every inland water sailor. Last month in Part I complete constructional details were given for the framework and planking of all four types of *Nomad*—racing sloop, ketch auxiliary cruiser, outboard cruiser, and rowboat.

This month all remaining details will be covered including the hollow mast and flexible boom of the racing sloop, the cruising rig, decking, rudder, folding cabin for the cruiser, sails and the novel bailing bag.

Using cheap materials *Nomad,* as a racing sloop or auxiliary cruiser, can be built for approximately $100. Custom built of the very best materials in a professional boat yard, the cost will probably come to $300.

After the planking has been completed and the intermediate frames are in place, the deck beams are put in position as shown in Fig. 15. The beams, ½" by 2¼", are cut to a twelve foot radius. At the mast 1" by 2½" frames are used. The beams are spaced at every main and intermediate frame and are fastened at the clamp in the same manner as the bottom intermediate frames are fastened at the chine (see Fig. 3, Part I).

With the deck frames in place the decking can be laid. This can be either ⅜" tongue and grooved white cedar, spruce, or cypress or it can be a double layer of ⅛" by 3" spruce laid diagonally and fastened as shown in Fig. 19.

It is advisable to build the double diagonal deck on a separate temporary form and fasten it to the boat in one piece trimming the edges and the cockpit after it is fastened. The whole deck is covered with six-ounce canvas laid in marine glue after it is completed. Where coamings are fitted especially in the way of the cruising cabin enough canvas should be allowed around the edges to make a turn up of about ¾" for watertightness. Be sure that before the deck is fitted that little wedges are fitted between the planks and bulkhead frames to secure watertightness at these points. Note also how spruce blocks are fitted between the beams wherever a fitting is placed on the deck or where mast tubes go through the deck. (Fig. 15).

The deck edges are supported by ½" diameter steel tubes of the seamless and thin wall variety as shown in Sections CC & BB, Fig. 15. They may be purchased from any airplane supply house. The wall thickness should be as thin as it is possible to obtain and the ends should be heated to a cherry red before flattening. The tubes should be

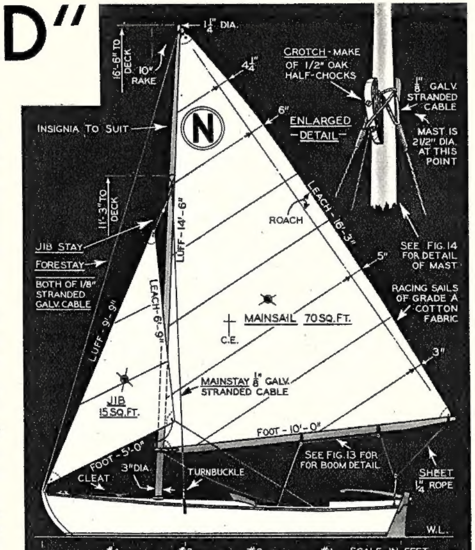

1¼" DIA.
16'-6" TO DECK
10" RAKE
4¼"
CROTCH-MAKE OF 1/2" OAK HALF-CHOCKS
⅛" GALV. STRANDED CABLE
MAST IS 21/2" DIA. AT THIS POINT
INSIGNIA TO SUIT
N
6"
ENLARGED -DETAIL-
11'-3" TO DECK
ROACH
LEACH-16'-3"
JIB STAY
FORESTAY
BOTH OF 1/8" STRANDED GALV. CABLE
LUFF-14'-6"
LEACH-6'-9"
5"
SEE FIG. 14 FOR DETAIL OF MAST
RACING SAILS OF GRADE A COTTON FABRIC
MAINSAIL 70 SQ.FT.
C.E.
LUFF-9'-9"
3"
MAINSTAY ⅛" GALV. STRANDED CABLE
JIB 15 SQ.FT.
FOOT-10'-0"
FOOT-5'-0"
3" DIA.
CLEAT
TURNBUCKLE
SEE FIG. 13 FOR FOR BOOM DETAIL
SHEET ¼" ROPE
W.L.
#4
#3
#2
#1
SCALE IN FEET
0
1
2
3
4

FIG. 12 – RACING RIG AND SAIL PLAN

Here is Nomad rigged as a racing sloop. Mast and boom are hollow to reduce weight. Note breakwater ahead of cockpit to turn down waves washing over.

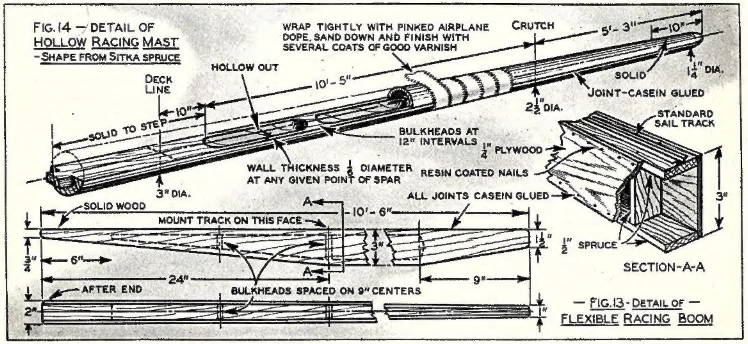
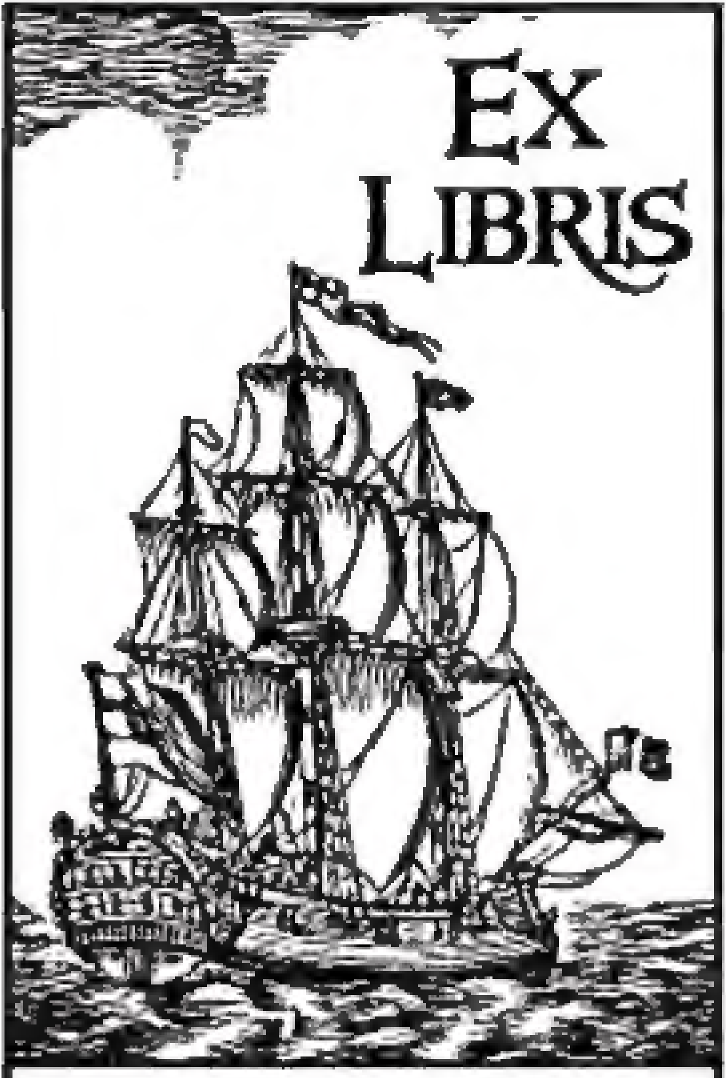

WRAP TIGHTLY WITH PINKED AIRPLANE DOPE, SAND DOWN AND FINISH WITH SEVERAL COATS OF GOOD VARNISH
CRUTCH
5'-3"
10"
HOLLOW OUT
DECK LINE
10'-5"
SOLID
1¼" DIA.
JOINT-CASEIN GLUED
2½" DIA.
10"
SOLID TO STEP
BULKHEADS AT 12" INTERVALS
STANDARD SAIL TRACK
¼" PLYWOOD
WALL THICKNESS ⅙ DIAMETER AT ANY GIVEN POINT OF SPAR
RESIN COATED NAILS
3" DIA.
ALL JOINTS CASEIN GLUED
SOLID WOOD
A
10'-6"
MOUNT TRACK ON THIS FACE
3"
1½"
½" SPRUCE
3"
¾"
6"
A
SECTION-A-A
24"
9"
AFTER END
BULKHEADS SPACED ON 9" CENTERS
2"
1"

FIG. 14 — DETAIL OF HOLLOW RACING MAST - SHAPE FROM SITKA SPRUCE

— FIG. 13 - DETAIL OF — FLEXIBLE RACING BOOM

The racing spars are built as shown above. The mast is stepped in the usual manner. In hollowing out the mast carefully follow directions in the text. Note that bulkheads are spaced on 9" centers in the flexible racing boom above.



Anon. Malefactor